

Chapter 3: Affected Environment and Environmental Consequences

This chapter describes the existing resources in the VC evaluation area that could be affected by construction of the project. The following resources are discussed in this chapter:

- Agriculture and farmland
- Land use
- Hazardous, toxic, and radiological waste
- Noise
- Vegetation, fish, and wildlife
- Water resources: floodplains, water quality, and waters of the United States (including wetlands)
- Social environment: neighborhood and community cohesion and quality of life, acquisitions and relocations, recreation, utilities, and economics
- Cultural resources

This chapter summarizes the existing resource conditions in the VC evaluation area and the expected environmental consequences associated with the Action Alternative. Where appropriate, the following sections address the specific federal and/or state requirements, or regulatory setting, that relates to the VC project. If there are no pertinent regulations, no regulatory setting is described.

For most topics discussed in this chapter, the resource impact analysis areas are contained within the project evaluation area (see Figure 1-1, Vineyard Connector Project Evaluation Area). The resource impact analyses focus on the appropriate area for impact evaluation rather than the larger project evaluation area to clearly identify expected impacts related directly to the project. Unless otherwise noted, the impact analysis area consists of the cut and fill and/or right-of-way limits of the Action Alternative. As described in Chapter 2, Alternatives, the Action Alternative includes the mainline VC and those side streets that would be improved as needed to serve the VC.

Unaffected Resources. Because the analyses conducted for this study found that the VC would not have any impacts on air quality, environmental justice populations, community facilities, or visual resources, these subjects are not addressed in this document. Detailed information about the existing conditions

related to air quality, environmental justice, visual resources, and community facilities can be found in *Technical Report 1: Environmental Resources Not Affected by the Vineyard Connector Project* (HDR 2008e), which is attached to this document as Appendix A.

3.1 General Regulatory Environment

The VC is a state-funded project. To ensure a detailed analysis of the expected project effects, UDOT prepared this environmental document in support of the state's process. Additionally, UDOT must also coordinate with other state agencies to ensure compliance with applicable state regulations. The applicable state rules and regulations that UDOT must comply with are listed in the section of this chapter for each resource.

If the proposed project is constructed, the U.S. Army Corps of Engineers (USACE) would need to issue a Section 404 Clean Water Act permit. Because there is no other federal involvement, USACE would act as the lead agency for the required environmental analysis for the permit as required by the National Environmental Policy Act (NEPA). As the lead agency, USACE would be responsible for ensuring compliance with other federal regulations. This document provides information in support of the USACE's NEPA compliance requirement and summarizes the other applicable federal regulations for each resource.

3.2 Agriculture and Farmland

3.2.1 Affected Environment

3.2.1.1 Regulatory Setting

Utah law does not specifically protect agricultural land from development, but one of the purposes of Utah's agricultural protection regulations is to support long-term agriculture in the state. Counties can also protect agricultural uses through zoning, which is established by a commission for each county that adopts a plan that assigns zone categories to all land within the county. Utah law also allows the formation of Agriculture Protection Areas (APAs), which are geographic areas where agricultural activities are given special protections. APAs are established according to state law but are managed at the local level.

APA lands are devoted to agricultural use and are identified as APAs according to Utah's Farmland Assessment Act. APAs are protected from state and local laws that would restrict farm practices, unless the regulations are required for public safety or are required by federal law. The county in which the APA is

located may not change the zoning designation of the APA land within the area unless all landowners give written approval for the change.

Counties record (enroll), assess, and evaluate lands protected under the Farmland Assessment Act. Taxes on APAs are assessed based on the enrolled lands' productive value.

APAs cannot be condemned for highway purposes unless (1) the landowner requests the removal of the designation or (2) the applicable legislative body (that is, the legislative body of the county, city, or town in which the agriculture protection zone is located) and the advisory board approve the condemnation, provided that "there is no reasonable and prudent alternative to the use of the land within the Agriculture Protection Area for the project" (Utah Administrative Code [UAC], Section 17-41-405[4][a]). Additionally, any state agency proposing a transportation corridor that would cross an APA must consider whether the corridor would interfere with agricultural activities. State agencies should also consider alternatives that would minimize the impacts on APAs (Utah Administrative Code, Section 17-41-406[3][B][b]). If protected agricultural areas remain in agricultural use after adjacent development, farm equipment access must be maintained to allow landowners to move farm machinery between parcels.

A landowner can petition the county to have his or her land designated as an APA. Once granted, APA status is typically maintained even after the property is developed and no longer in agricultural use, unless the property owner files a petition to remove the land from the APA. When this occurs, the rest of the APA maintains its status, and the boundaries of the APA are redefined. APAs are reviewed every 20 years to determine if the APA status should be maintained, modified, or terminated.

3.2.1.2 Agriculture and Farmland Resources in the Evaluation Area

Information about farmlands was obtained using the following methods:

- Reviewing the online 2002 U.S. Department of Agriculture (USDA) Census of Agriculture and the Utah State Water Plan (Utah Division of Water Resources 2003a)
- Reviewing the Utah Division of Water Resources *Water-Related Land Use Data Inventory* map (Utah Division of Water Resources 2003b), as well as reviewing city and county Web sites
- Reviewing city and county maps

Agriculture Protection Areas

Within the VC evaluation area, three areas are designated as APAs. These APAs are primarily used to raise crops and livestock and are summarized in Table 3.2-1 and shown in Figure 3-1 below (this figure shows only that portion of the evaluation area that is in agricultural production).

Table 3.2-1. Agriculture Protection Areas in the Evaluation Area

Agriculture Protection Area	Acreage within Evaluation Area ^a
APA 1	152
APA 2	183
APA 3	391
Total	726

Source: Utah County 2007

^a These acreages reflect only the area of the APA that is inside the evaluation area, not the entire APA parcel.

Local Agricultural Production

Though not specifically regulated under state law, local agricultural production provides a gauge of overall agricultural productivity in and the importance of agriculture to the evaluation area.

Many tracts of land that are currently in agricultural use or are zoned for agricultural use are planned for residential development per city and county land-use plans, which reflects the trend to convert agricultural land into residential subdivisions.

As reported by the Utah Division of Water Resources (2003b), farmland in the evaluation area is used for cultivation (cropland) and pasture, although some land traditionally used for agriculture is idle (see Table 3.2-2 below). Active agricultural production in the evaluation area focuses on land that is not inside incorporated areas, since land under the jurisdictions of incorporated cities and towns is generally considered to be subject to conversion to non-agricultural uses and might not be included in state and federal calculations of active, available agricultural land. In the VC evaluation area, farmland is dominated by irrigated pasture land and irrigated crops, including mostly alfalfa and corn. Crops are frequently rotated; therefore, while the information shown in Figure 3-1 below and in Table 3.2-2 provides an accurate picture of irrigated cropland, it might not reflect the most current crop pattern.

Figure 3-1. Agriculture and Farmland in the Vineyard Connector Evaluation Area

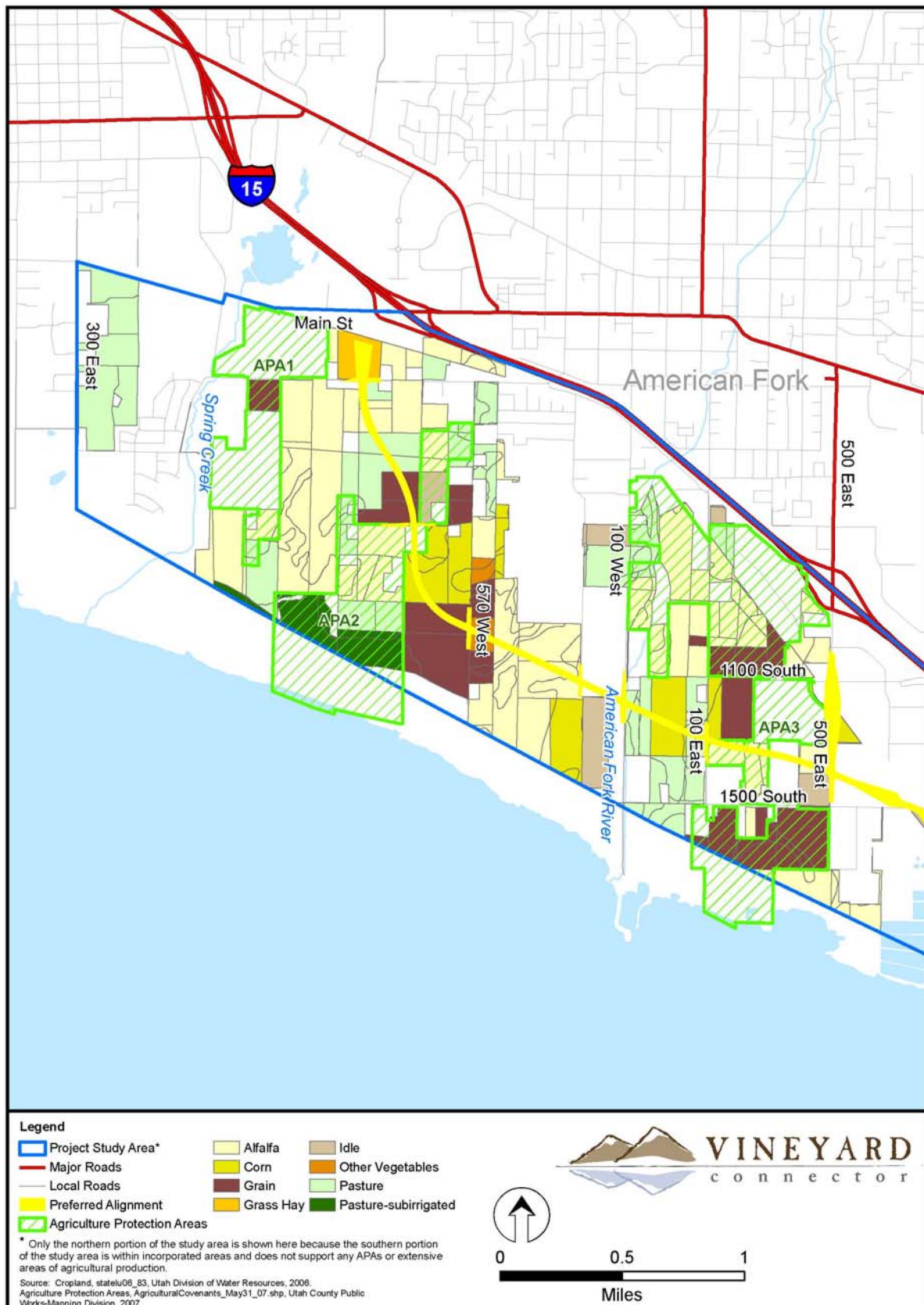


Table 3.2-2. Crops and Farmland in the Evaluation Area

Crop or Farmland Type	Acres
<i>Irrigated Crops or Farmland</i>	
Alfalfa	665
Corn	131
Other vegetables	15
Grain	245
Grass hay	20
Pasture ^a	401
Total irrigated	1,477
<i>Non-irrigated Crops or Farmland</i>	
Idle	81
Total non-irrigated	81

Source: Utah Division of Water Resources
2003b

^a Includes sub-irrigated pasture.

According to the 2002 Census of Agriculture (USDA 2002), the top five commodities in Utah County are cattle and calves, nursery and greenhouse crops, milk and other dairy products, other animals and animal products including mink or their pelts, and other crops and hay.

3.2.2 Environmental Consequences

This section analyzes the impacts from the proposed alternatives on APAs and actively farmed land that is not in incorporated areas. Agriculture and farmland impacts were evaluated using information from several sources including site visits, information obtained from the USDA Census of Agriculture, the Utah State Water Plan, water-related land-use inventory mapping from the Utah Division of Water Resources, and reviews of city and county maps.

3.2.2.1 No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no direct impacts to agriculture or farmland would occur as a result of the project. In addition, the No-Action Alternative would not cause any indirect impacts to agriculture or farmland. Agriculture and farmland would continue to be affected and/or altered by the ongoing and planned development in the area, including the construction of new roads described in the 2007 RTP and included in the cities' transportation master plans.

3.2.2.2 Action Alternative

APA Impacts

The Action Alternative would pass through two designated APAs and would directly affect about 4 acres of APA land (see Figure 3-1 above, Agriculture and Farmland in the Vineyard Connector Evaluation Area). When considering potential alignments that would directly affect APAs, UDOT is required to demonstrate that there are other no reasonable and prudent alternatives to using APA lands. As discussed in Chapter 2, Alternatives, UDOT evaluated three alignment options through the area that includes three APAs and selected an option that had the least impact on designated APAs. Because of the distribution pattern of APAs and other urban land uses in this part of the evaluation area, complete avoidance of APAs was not feasible. So, in designing the Action Alternative, UDOT looked closely at how APA impacts could be minimized. Under the Action Alternative, complete avoidance is not reasonable or prudent.

UDOT does not consider acquiring farmland for roadway use a displacement unless the amount of farmland remaining is not enough to farm. Although the Action Alternative would affect two APAs, UDOT expects the alternative to leave enough farmable area in the APAs that they could still be farmed.

Active Crop Production Impacts

The Action Alternative would directly affect about 42 acres of actively farmed cropland (15.2 acres of alfalfa, 9.6 acres of corn, 1.9 acres of other vegetables, 9.2 acres of grain, and 5.9 acres of grass hay), about 7.7 acres of pasture, and about 2.1 acres of idle farmland within the impact analysis area (see Table 3.2-3).

Table 3.2-3. Crops and Farmland in the Impact Analysis Area

Crop or Farmland Type	Acres Affected
<i>Irrigated Crops or Farmland</i>	
Alfalfa	15.2
Corn	9.6
Other vegetables	1.9
Grain	9.2
Grass hay	5.9
Pasture	7.7
<i>Non-irrigated Crops or Farmland</i>	
Idle	2.1

Source: Utah Division of Water Resources 2006

As shown in Figure 3-1 above, Agriculture and Farmland in the Vineyard Connector Evaluation Area, the VC would bisect areas of alfalfa, other vegetable, grain, grass hay, and pasture production but would probably allow farming of the remainder of these crops. The VC would bisect an area of corn production and might prevent farming on part of the property.

Other Agricultural Production Impacts

By removing 2% of the available pasture, the Action Alternative could have a minor effect on cattle production in Utah County. Recent cattle production in Utah County and statewide has remained steady (Utah Department of Agriculture and Food 2007). Cattle production is greatly affected by market conditions, and UDOT does not expect the reduction of 2% of the land available to affect future cattle production any more than regular market fluctuations would.

The Action Alternative would pass within 700 feet of an active mink farm between about 7300 West and 6500 West in an unincorporated area of Utah County. The alternative would not touch the parcel that contains the mink farm. However, the operator of the mink farm is concerned that increased light, dust, and noise from the VC could affect mink biology, which could affect mink production (HDR 2008f). When right-of-way is not required from a parcel, UDOT does not normally evaluate how construction of a facility might affect ongoing farming operations. Because construction of the VC would not involve acquiring any land from the mink farm parcel, UDOT would probably not negotiate with the landowner under most circumstances.

The project would not directly affect nursery or greenhouse crops.

Mitigation Measures for Impacts to Agriculture and Farmland

To ensure that impacts to all active farming operations (including those in incorporated areas) related to crop production, grazing, and mink production are minimized, UDOT will work with affected landowners to determine the level of impact to the viability of each farming operation on a case-by-case basis as design moves forward and right-of-way is acquired. UDOT will also work directly with property owners to ensure that access to property is maintained. Impacts to farmland property and buildings will be compensated according to the requirements of the Uniform Relocation and Assistance and Real Property Acquisition Policies Act of 1970, as amended, and state guidelines.

3.3 Land Use

3.3.1 Affected Environment

3.3.1.1 Regulatory Setting

The Utah Legislature has delegated responsibility for land-use planning and regulation to the counties and cities. These local governments develop general or comprehensive plans for land development within their jurisdictional boundaries. The comprehensive, or general, plans often contain a transportation element that outlines the transportation improvements that would be needed to support anticipated land-use patterns.

Although there are no state regulations that require highway or road projects proposed by the State to be consistent with local land-use plans, UDOT reviewed these plans to help understand how the project could change land-use patterns and the relationship of planned land uses and road network needs.

3.3.1.2 Description of Land Uses in the Evaluation Area

The evaluation area encompasses 6,271 acres of land and includes portions of Lehi, American Fork, Lindon, Vineyard, and Orem and portions of unincorporated land under the jurisdiction of Utah County. Table 3.3-1 summarizes the amount of land by jurisdiction in the evaluation area. General descriptions of each city's land uses in the evaluation area follow.

Table 3.3-1. Land Distribution by Jurisdiction

Jurisdiction	Total Size (acres)	Acres in Evaluation Area
Lehi	14,842	280
American Fork	5,815	1,078
Lindon	5,488	818
Vineyard	4,068	2,319
Orem	11,655	626
Utah County	1,371,520	1,883

Lehi

Lehi is the easternmost city in the evaluation area. A small section of the eastern limits of the city is within the VC evaluation area (see Table 3.3-2 and Figure 3-2 below). The Lehi City General Plan land-use map (Lehi City 2001) designates most of the land in this area for light-industrial and low-density residential land uses with the exception of the Spring Creek corridor, which is designated as open space. The City plans to eventually establish a recreational trail along the Spring Creek corridor between Mill Pond to the north and the planned Lake Shore Trail to the south.

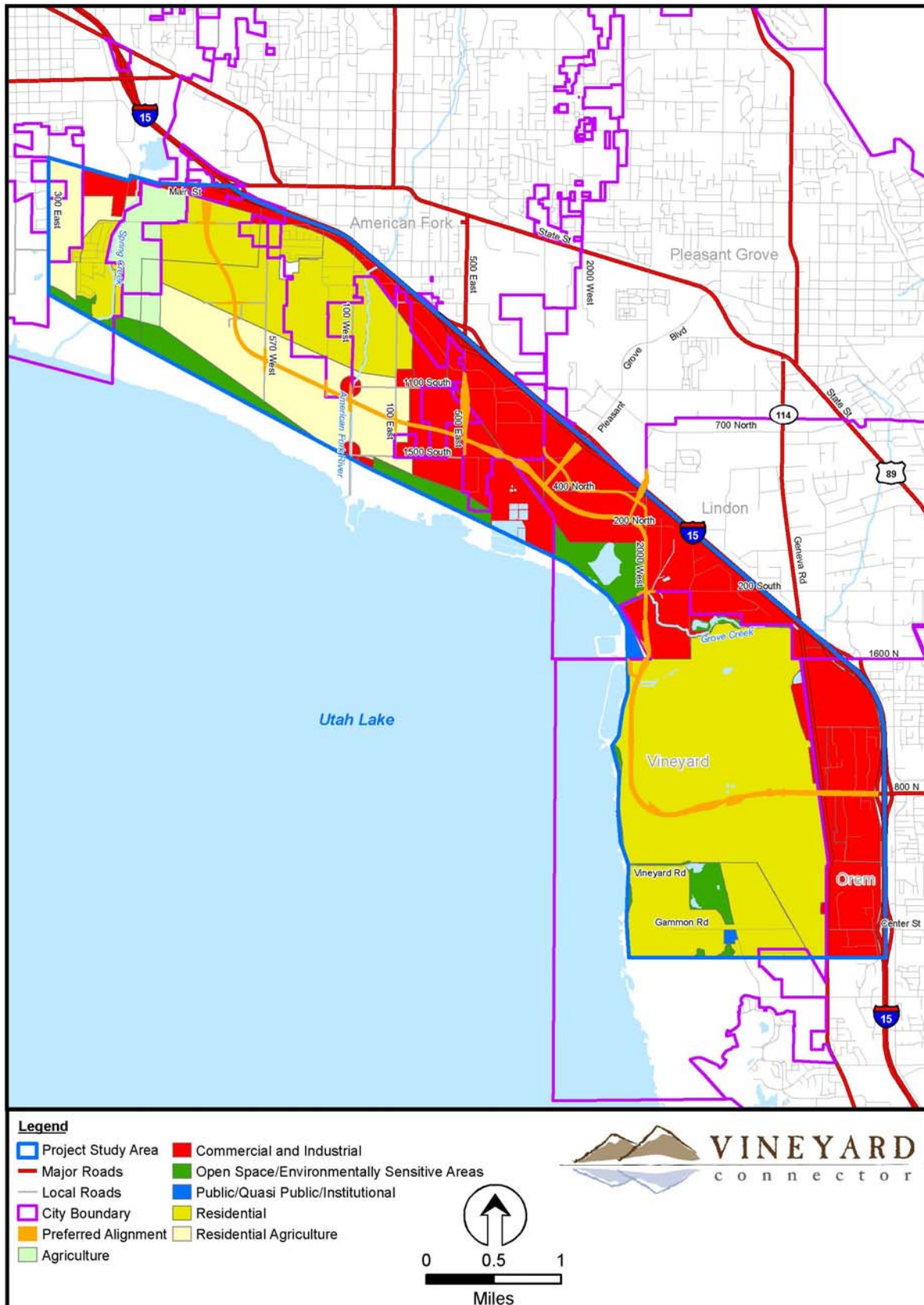
Table 3.3-2. Planned Land Uses in the Evaluation Area

Land-Use Type	Approximate Acres of Land Use Type by Jurisdiction					
	Lehi	American Fork	Lindon	Vineyard	Orem	Utah County
Residential	122.0	299.7	0.0	2,028.3	625.9	584.0
Residential agriculture	79.5	38.6	0.0	0.0	0.0	679.8
Agriculture	0.0	165.2	0.0	0.0	0.0	49.0
Commercial and industrial	54.4	555.9	658.6	165.6	14.5	383.6
Public/quasi-public/institutional	0.0	12.7	14.0	6.1	0.0	0.0
Open space/environmentally sensitive areas	24.3	6.0	145.4	118.9	0.0	186.8

Sources: American Fork City 2005; Utah County 2006; J-U-B 2006, 2007; City of Orem 2008

The land-use types are a compilation and generalization of the different types defined by each city. Total acreages might not equal those shown above in Table 3.3-1, Land Distribution by Jurisdiction, due to rounding, the assignment of land uses to street rights-of-way, and overlapping land-use designation assignments (for example, two different cities assigning land-use designations to the same area).

Figure 3-2. Planned Land Uses in the Vineyard Connector Evaluation Area



American Fork

According to the American Fork General Plan, the evaluation area encompasses the Southside Residential and Southside Commercial Planning district of American Fork. This area is south of the Southern Pacific and Union Pacific Railroad and I-15 corridors and extends to the shoreline of Utah Lake (American Fork City 2005). Although current land uses in this area are dominated by very low-density residential (residential agriculture), agricultural, and light-industrial/business park uses, the City is planning for higher-density residential and commercial uses in the coming years. Much of the land south of the existing American Fork City Center and in the VC evaluation area is not currently within the American Fork city boundaries, but City representatives have stated that they expect most of the land in this area to eventually be annexed to the City (HDR 2008a). The future land-use plan shows that this area would be developed as very low, low, and medium-density residential with a band of shoreline protection zone between the anticipated residential areas and Utah Lake (see Figure 3-2 above, Planned Land Uses in the Vineyard Connector Evaluation Area). The City's future land-use map shows that an area on the far western edge of the city and adjacent to Spring Creek would maintain an agricultural land-use designation and that existing industrial and commercial areas along I-15 would remain (American Fork City 2005).

American Fork's recent annexation of a number of properties south of the American Fork Main Street/I-15 interchange, which total about 156 acres, indicates that the expected growth of the city's incorporated area is already beginning. City representatives have noted that two additional properties totaling about 55 acres will be annexed in the coming months pending final approvals (Knobloch 2008). As annexations continue, the City would review and might revise its long-range land-use plan. The City intends to provide commercial nodes for future residential development through small neighborhood commercial centers and larger commercial centers concentrated adjacent to freeway interchanges (HDR 2008a; American Fork City 2005).

Lindon

Lindon City land in the evaluation area is dominated by commercial and industrial uses. These uses include isolated businesses, a waste transfer station, a power plant, and an animal shelter. Lindon's future plans show a continuation of this pattern (J-U-B 2006).

The Lindon City General Plan shows, and City representatives have described, future development of a commercial core in the area just west of the Pleasant Grove Boulevard/I-15 interchange. Non-residential development in this area will

supplement Lindon's existing commercial core that is associated with the city center. The Lindon City General Plan land-use map (J-U-B 2006) designates this area as commercial, with land along I-15 south of the Pleasant Grove Boulevard/I-15 interchange identified for light-industrial development and land next to Utah Lake as open space (see Figure 3-2 above, Planned Land Uses in the Vineyard Connector Evaluation Area, and Table 3.3-2 above, Planned Land Uses in the Evaluation Area).

According to the City's General Plan, Lindon will continue to grow using mixed-use planning guidelines that will preserve the rural and unique characteristics of the city. Growth is limited by the mountains, Utah Lake, and the boundaries of adjacent cities (J-U-B 2006).

Vineyard

Most land in the town of Vineyard and in the VC evaluation area is part of the former Geneva Steel plant site. The Vineyard General Plan designates this area as a future Planned Community and is currently working with the land owner to develop a plan for the area. There is some industrial land on the north end of Vineyard in the evaluation area. The General Plan land-use map shows that the Town of Vineyard intends to maintain this area for industrial uses (J-U-B 2007).

Future types of uses designated for the former Geneva Steel site will greatly affect the future of this small town. The Town expects that development of this 1,750-acre area will be dominated by mixed uses and multi-family and other high-density housing at the community core with single-family lots closer to Utah Lake (see Figure 3-2 above, Planned Land Uses in the Vineyard Connector Evaluation Area, and Table 3.3-2 above, Planned Land Uses in the Evaluation Area). UTA is currently planning to construct an intermodal hub (bus rapid transit and future light rail) in the community core (UTA 2008).

Orem

A large portion of Orem's existing industrial area, which the City expects to maintain as industrial and commercial in the future, is in the VC evaluation area (see Figure 3-2 above, Planned Land Uses in the Vineyard Connector Evaluation Area, and Table 3.3-2 above, Planned Land Uses in the Evaluation Area). The City of Orem General Plan shows that, in the future, this area will also have some regional commercial development (City of Orem 2001).

Utah County

Less than 1% of the evaluation area is unincorporated and under the jurisdiction of Utah County. County-administered areas are located south of American Fork

and are dominated by agricultural uses (see Figure 3-2 above, Planned Land Uses in the Vineyard Connector Evaluation Area).

The Utah County General Plan land-use map (Utah County 2006) identifies all land under county jurisdiction and within the evaluation area as agricultural land. The General Plan document describes such land as suitable for uses relating to the grazing and pasturing livestock, mining, and agriculture operations and for low-density residential development.

If recent development trends are an indicator of future patterns, American Fork City is likely to annex county-administered lands in the coming years. The future uses of these lands that are currently administered by the county could change depending on future annexations. However, the American Fork General Plan states that current agricultural protections would stay in place if the area is annexed unless the landowner chooses to have the protections removed.

3.3.1.3 Transportation Element Improvements That Would Complement Future Land-Use Patterns

Lehi

The Lehi City General Plan transportation element includes a master transportation plan (Lehi City 2008) that describes expected future land uses. This plan shows a 106-foot-wide principal arterial along 1900 South, which would enter the VC evaluation area just north of the Utah Lake shore on the western edge of the evaluation area. It also shows an 80-foot-wide major arterial along 300 East between 1900 South and Pioneer Crossing.

American Fork

The American Fork General Plan transportation element (American Fork City 2004) contains a major street plan to complement the City's land-use plan. The major street plan map, which was updated in 2008, shows future arterial roads along 800 South (which connects into Lehi's 1900 South), along 900 West, along 1500 South between 900 West and 100 East, and between 1100 South and 1500 South through an area east of the Union Pacific railroad tracks and west of I-15.

Lindon

The Lindon City General Plan includes a street master plan map (J-U-B 2006). The master plan map shows only one arterial road: 1500 South between I-15 and the western city limit. This is identical to what American Fork's major street plan map shows. Lindon's street master plan map shows numerous collector roads in the evaluation area; these roads are intended to serve the expected light-industrial and commercial development in the area.

Vineyard

The Town of Vineyard has a major streets plan that supports its expected future land-use patterns. Town representatives have been working directly with the developer of the Geneva Steel plant site to refine the development plan and the future street network. Because the Town of Vineyard and the developer of the Geneva Steel plant site know that the VC could be constructed, they are planning for a major arterial through this area of the town.

Orem

The City of Orem street classification map shows 800 North and Geneva Road as principal arterials (City of Orem 2003). No new arterial roads are shown in the project vicinity.

Utah County

The Utah County General Plan transportation element map (Utah County 2006) shows a new road between about 1900 South and Center Street in Lehi and about 1500 South and 100 East in American Fork. This new road would connect a local collector (1900 South and Center Street) and an arterial (1500 South and 100 East), but would probably be an arterial road for most or all of its length. The Utah County General Plan also shows a new arterial between about 1500 South and 100 East in American Fork and 800 North and Geneva Road in Orem; this new road generally follows the same alignment as the proposed VC. Finally, the Utah County General Plan shows 1500 South and 1100 South as arterial roads. Compared to the American Fork major streets plan, the 1500 South designation is consistent, but the 1100 South designation is not (the American Fork plan shows 1100 South as a major collector).

3.3.2 Environmental Consequences

The expected land-use impacts from the VC were determined by using geographical information system (GIS) databases of land-use information, reviewing land-use development trends, and reviewing existing land use in the field.

Impacts were identified and evaluated by reviewing how the project alignment would affect the patterns of designated, expected future land uses along the road corridor. To determine the impacts to land use, the cities' and Utah County's future land-use maps were converted into a single electronic map using GIS software. The proposed alignment was then overlaid onto the land-use map to calculate the specific acreage of impacts (that is, the amount of each type of land use that would be converted to a roadway). Figure 3-2 above, Planned Land Uses

in the Vineyard Connector Evaluation Area, shows the land uses and the Action Alternative.

These data were then reviewed along with information from the governments of Lehi, American Fork, Lindon, Vineyard, and Orem about development trends and observations made in the field to identify the expected impacts to land use in the impact analysis area.

3.3.2.1 No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no land would be converted from its existing use to transportation use as a result of the project. The No-Action Alternative would not affect the amount and distribution of land uses in the impact analysis area or along the project alignment.

3.3.2.2 Action Alternative

As shown in Table 3.3-3 below, construction of the VC would convert about 223 acres of land to transportation use. This total includes 103 acres of land currently used for or expected to be used for commercial or industrial development, 87 acres of land currently used for or expected to be used for residential development, 29 acres of land currently used for or expected to be used for residential agricultural development, 4 acres of open space, and less than 0.2 acre of public land. About 15 acres of the 223 acres are roadway that already exists within the impact analysis area and would be incorporated into the project; in most cases the cities assign a land-use designation to these transportation corridors, so they cannot easily be separated from other types of planned land uses. For example, 800 North in Orem, 2000 West in Lindon, and 500 East in American Fork are existing roads that would become part of the Action Alternative.

UDOT met extensively with representatives from American Fork City and Lindon City to discuss ways to accommodate the expected future land-use and transportation patterns in the commercial/light-industrial areas of these two cities, which come together near Pleasant Grove Boulevard. After much negotiation with American Fork City, UDOT chose an alignment that addressed most, but not all, of American Fork City's concerns about incompatibilities with the City's land-use and transportation plans. UDOT's decision was ultimately based on cost, logistics, and resource impact concerns. UDOT has pledged to continue working with American Fork City on roadway details as the final design progresses. Lindon City representatives are mostly agreeable to the VC alignment but also continue to have concerns about how the new road might affect future land-use patterns in the commercial and industrial area. UDOT will also continue to work with Lindon City through final design. In summary, the

VC as proposed is not entirely compatible with American Fork City's and Lindon City's land-use and transportation plans, but UDOT believes that it has addressed many of the cities' concerns and has pledged to continue coordinating with the cities in good faith.

Table 3.3-3. Land-Use Conversions Associated with the Action Alternative

City/Jurisdiction	Acres by Type of Planned Use					Total (acres)
	Commercial/ Industrial	Residential	Residential Agriculture	Open Space/ Environmentally Sensitive	Public/ Institutional	
American Fork	26.8	19.9	2.7	0.0	<0.1	49.5
Lindon	45.1	0.0	NA	3.1	<0.1	48.3
Vineyard	9.2	59.8	NA	0.6	0.0	69.6
Orem	10.0	0.0	0.0	0.0	0.0	10.0
Unincorporated Utah County	12.3	7.4	25.9	0.0	0.0	45.6
Total by Type	103.4	87.1	28.6	3.7	<0.2	223.0

Lehi

The Action Alternative does not enter Lehi and therefore would not affect current or future land-use patterns in that city. Construction of the Action Alternative would not preclude the development of a future arterial road along 1900 South.

American Fork

The Action Alternative would begin just west of the American Fork Main Street/I-15 interchange and travel south through mostly undeveloped land. Construction of the Action Alternative would convert a total of about 49.5 acres of land identified for future commercial/industrial use to transportation use (see Table 3.3-3 above, Land-Use Conversions Associated with the Action Alternative). Construction of the VC is not expected to affect the expected commercial and industrial development pattern and would probably improve access to and through the existing and planned commercial and industrial areas. UDOT does not expect construction of the roadway and conversion of residential and residential agriculture uses to affect the future distribution of residential and residential agricultural uses (for information about impacts to individual landowners, see Section 3.8.1, Neighborhood and Community Cohesion and Quality of Life). Based on the City's land-use plan, land-use patterns could change on lands near the Action Alternative over time; these changes would probably occur even if the VC is not constructed.

American Fork's General Plan notes a lack of north-south transportation routes to accommodate new development. The Action Alternative would complement American Fork's future plans by providing better access from planned residential and commercial areas to the I-15 connections at Main Street and 500 East. While the Action Alternative is not on the exact alignment of other arterial roads shown in American Fork's major street plan, it is most like the planned arterial along 900 West and could probably serve the same purposes as that future roadway. Construction of the Action Alternative would not preclude construction of other planned future arterials along 800 South (Lehi 1900 South) and between 1100 South and 1500 South through an area east of the Union Pacific railroad tracks and west of I-15. The Action Alternative would require closing 1500 South, so that street could not be developed as a major arterial in the future. However, the VC would provide an alternate route, so circulation through the area would be maintained.

Lindon

Land along the Action Alternative in Lindon is primarily designated for commercial and light-industrial uses (see Figure 3-2 above, Planned Land Uses in the Vineyard Connector Evaluation Area, and Table 3.3-3 above, Land-Use Conversions Associated with the Action Alternative). Construction of the Action Alternative would convert about 45 acres of this area that is planned for commercial and industrial development to transportation use (see Table 3.3-3 above). Lindon City staff members have stated that the VC could adversely affect the expected future commercial and light-industrial development by fragmenting the area around the Pleasant Grove Boulevard interchange and that it could affect access to some properties (HDR 2008b). UDOT met several times with Lindon City representatives to develop an alignment that would accommodate the planned network and that the City would be comfortable with. As proposed, the Action Alternative addresses Lindon City's concerns to the extent possible.

Vineyard

The Action Alternative would convert about 60 acres of land designated for future residential use to transportation use. The 60 acres are all within the Planned Community area on the former Geneva Steel plant site as identified by the Town of Vineyard in its General Plan. As it developed the Action Alternative, UDOT met with Town of Vineyard representatives and the Planned Community developers to ensure that the VC would be compatible with the expected land-use patterns and future transportation system. Construction of the Action Alternative would not preclude the development of the Planned Community.

Orem

Construction of the Action Alternative would convert about 10 acres of land identified for commercial and industrial use to transportation use (see Table 3.3-3 above, Land-Use Conversions Associated with the Action Alternative). The City of Orem General Plan shows that the area surrounding the Action Alternative will continue to be used for industrial uses but will also have some regional commercial development. Construction of the Action Alternative is expected to complement the existing and planned industrial and commercial land-use pattern in Orem and to complement the city's existing and future transportation system.

Utah County

The Utah County General Plan land use map (Utah County 2006) shows that all land under county jurisdiction and within the impact analysis area will continue to be used for agriculture. As stated in Section 3.3.1.2, Description of Land Uses in the Evaluation Area, less than 1% of the evaluation area is unincorporated and under the jurisdiction of Utah County. Construction of the Action Alternative would convert about 33 acres of agricultural-residential/residential land and about 12 acres of commercial and industrial land to transportation use (see Table 3.3-3 above, Land-Use Conversions Associated with the Action Alternative). As stated in Section 3.3.1.2, American Fork City intends to continue annexing county-administered land into the city, which could affect the nature of future uses on county land. Because this change would happen with or without construction of the VC, the Action Alternative is not expected to change how American Fork City would plan this area in the future.

Mitigation Measures for Impacts to Land Use

UDOT will continue to work with Utah County and the governments of American Fork, Lindon, Vineyard, and Orem to ensure that access to and from the VC meets the jurisdictions' needs as well as UDOT's standards for access control with a focus on maximizing the desired land use of properties along and near the new road.

3.4 Hazardous, Toxic, and Radiological Waste

3.4.1 Affected Environment

3.4.1.1 Regulatory Setting

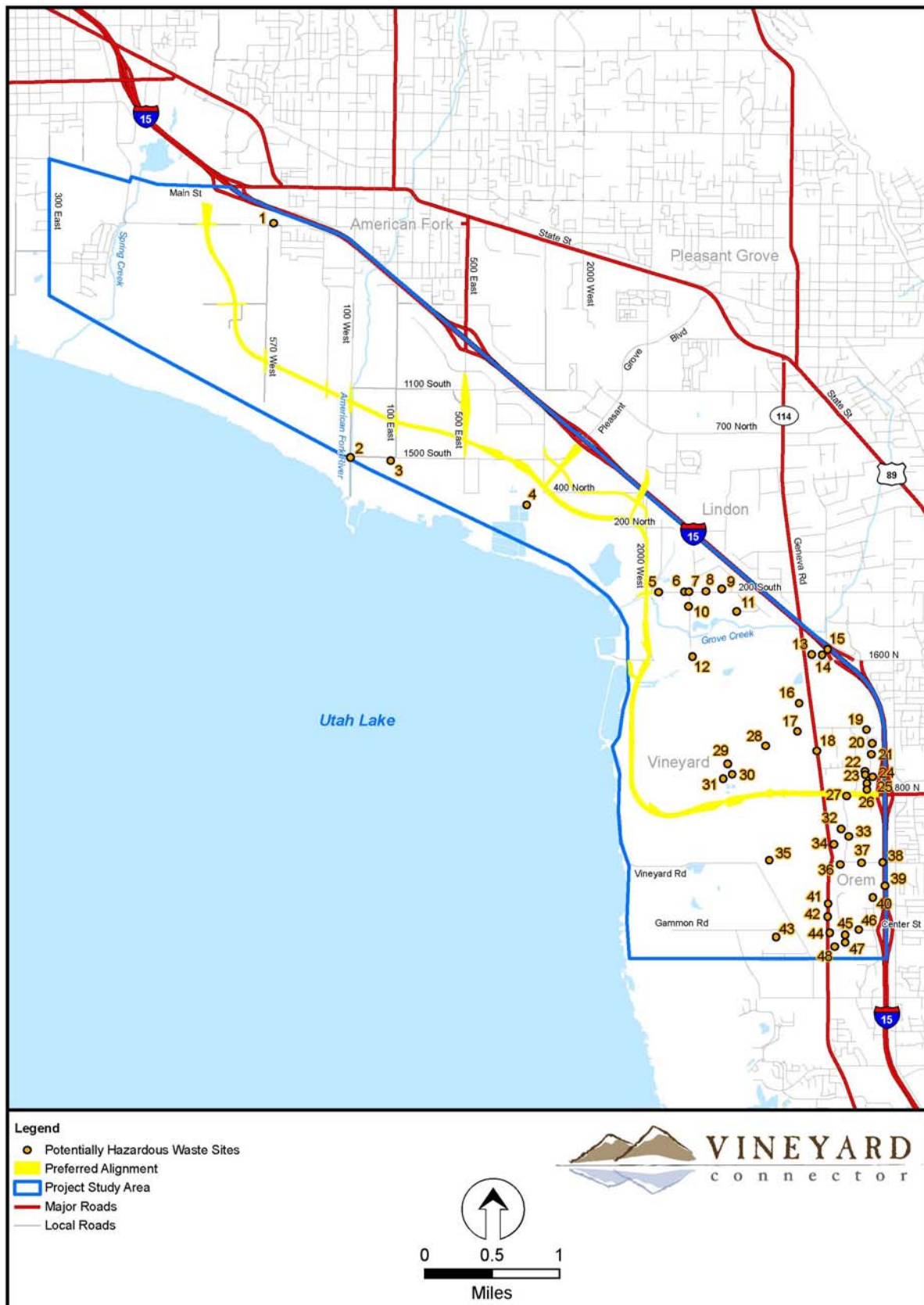
Hazardous sites are regulated by the Resource Conservation and Recovery Act (RCRA); by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and by Utah Administrative Code Title 19, Environmental Quality Code. These regulations provide guidance on how to address the presence or potential presence of hazardous sites when planning for and constructing transportation projects.

3.4.1.2 Identification of Potentially Hazardous, Toxic, and Radiological Waste Sites in the Evaluation Area

Potentially hazardous sites in the evaluation area were identified by reviewing the Utah Division of Environmental Response and Remediation (DERR) Interactive Map (DERR 2008) and EPA's Envirofacts Warehouse (EPA 2008). The site search was supplemented by a review of the Utah Division of Solid and Hazardous Waste active and closed landfills database. Potentially hazardous sites in the evaluation area are shown in Figure 3-3 below and in Appendix B, Potentially Hazardous Sites in the Vineyard Connector Evaluation Area.

The database searches identified 48 potentially hazardous sites in the evaluation area. Each site was reviewed to identify the relative likelihood of finding contamination. Sites of concern were categorized as having a high, moderate, or low probability of environmental degradation based on the available information about materials expected to be present at each site. See Appendix B for detailed information about each site.

Figure 3-3. Potentially Hazardous Sites in the Evaluation Area



3.4.2 Environmental Consequences

Because hazardous materials can move from initial points of discharge through soil and groundwater, the hazardous waste impact analysis area encompasses 0.25 mile on either side of the Action Alternative centerline. Typical concerns raised when a transportation project affects hazardous sites include:

- The spread of existing soil or groundwater contamination through road construction activities
- Potential for increased construction costs
- Potential for construction delays
- Construction worker health and safety
- The short-term and long-term liability associated with acquiring environmentally distressed properties

The evaluation of the 48 sites within 0.25 mile of the Action Alternative found that two sites of concern could be directly affected by project construction. These sites are described in Section 3.4.2.2, Action Alternative.

3.4.2.1 No-Action Alternative

Under the No-Action Alternative, the VC would not be constructed and no potentially hazardous sites would be affected. Ongoing cleanup activities required under state and federal laws would continue throughout the evaluation area.

3.4.2.2 Action Alternative

The evaluation area includes the former Geneva Steel plant site, a large area known to be contaminated with hazardous materials. The former plant site is currently undergoing remediation and cleanup under a RCRA hazardous waste post-closure permit issued by EPA and the State of Utah (identification number UTD009086133). For the purpose of this evaluation, UDOT assumes that all hazardous waste and hazardous sites within the former Geneva Steel plant site that might be along or near the VC would be completely remediated as part of the post-closure permit cleanup. However, during construction, contamination could be encountered given the site's history.

In addition to the entire Geneva Steel plant site, the Consolidated Red-E-Mix site (site 27 on Figure 3-3 above, Potentially Hazardous Sites in the Evaluation Area) could be of a concern to the project because it is within the project footprint. This site, located at 1550 West 800 North in Orem, contained a leaking underground storage tank that was closed and removed. Since the tank has been removed,

UDOT assumes that the site has been fully cleaned up. However, during construction, contamination could be encountered given the site's history.

Mitigation Measures for Impacts to Hazardous, Toxic, and Radiological Waste Sites

Because mitigation measures for the Geneva Steel plant site are described in the Final Post Closure Permit Agreement, no additional mitigation measures for potential hazardous materials identification or cleanup along the road alignment are proposed. However, it is likely that UDOT will perform a Level I site assessment of the final alignment before right-of-way is purchased. During construction, if workers encounter previously undocumented soil contamination or hazardous sites anywhere along the alignment, all activity in the affected area will stop until the hazard is evaluated and appropriate protection measures can be implemented consistent with the UDOT Standard Specification that addresses hazardous materials discovered during construction (Section 01355, Part 1.6). UDOT or its contractor will give special attention to those areas where potentially hazardous sites are within 0.25 mile of the Action Alternative.

The contractor will also ensure that workers comply with the UDOT Standard Specification that addresses the use of hazardous materials on the construction site (Section 01355, Part 1.7).

3.5 Noise

3.5.1 Affected Environment

3.5.1.1 Regulatory Setting

Expected traffic noise along the VC was reviewed using noise models and methodologies used by UDOT.

UDOT's Noise-Abatement Policy

UDOT is committed to reducing noise from highway traffic that could adversely affect human activities and the quality of life for residents who live near heavily traveled roads. For the VC project, UDOT would install noise-mitigation measures according to its Noise-Abatement Policy (UDOT 08A2-1, January 2008). The requirements for predicting highway traffic noise, the noise analysis methodology used to predict noise associated with the Action Alternative, and the noise-abatement criteria in this policy are consistent with federal regulation 23 Code of Federal Regulations (CFR) 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, and with Utah Administrative Code 72-6-111 and 72-6-112.

UDOT's current noise-abatement criteria (NAC) are shown in Table 3.5-1.

Table 3.5-1. UDOT Noise-Abatement Criteria

Activity Category	NAC (L_{eq} Noise Levels in dBA) ^a	Description of Activity Category
A	56 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	66 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	71 (exterior)	Developed lands, properties, or activities not included in Categories A or B above
D	—	Undeveloped lands
E	51 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: UDOT Policy 08A2-1 (January 2008)

^a L_{eq} = equivalent sound level; dBA = decibels on the A-weighted scale

Under the noise policy, a noise level of 66 dBA or greater is considered to exceed the residential NAC. A 10-dBA increase over existing noise levels is considered to substantially exceed the NAC.

3.5.1.2 Characteristics of Noise in the Evaluation Area

The existing noise characteristics of the evaluation area can be measured using sound-level meters. These meters are used to measure the pressure fluctuations caused by sound waves and to record separate measurements for different sound frequency ranges. Several frequency-weighting schemes have been used to develop composite decibel scales that approximate the way the human ear responds to sound levels. The A-weighted decibel (dBA) scale is most widely used for this purpose. Typical A-weighted noise levels for various types of sound sources are summarized in Table 3.5-2 below.

Table 3.5-2. Weighted Noise Levels and Human Response

Sound Source	dB ^a	Response Criteria
Carrier deck jet operation	140	Limit amplified speech
Limit of amplified speech	130	Painfully loud
Jet takeoff (200 feet)	120	Threshold of feeling and pain
Auto horn (3 feet)		
Riveting machine	110	
Jet takeoff (2,000 feet)		
Shout (0.5 foot)	100	Very annoying
New York subway station		
Heavy truck (50 feet)	90	Hearing damage (8-hour exposure)
Pneumatic drill (50 feet)		
Passenger train (100 feet)	80	Annoying
Helicopter (in-flight, 500 feet)		
Freight train (50 feet)		
Freeway traffic (50 feet)	70	Intrusive
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)		
Normal speech (15 feet)	50	Quiet
Living room, bedroom, library	40	
Soft whisper (15 feet)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

Source: CEQ 1970

^a Typical A-weighted noise levels taken with a sound-level meter and expressed as decibels on the "A" scale. The "A" scale approximates the frequency response of the human ear.

The VC evaluation area consists of mostly undeveloped land with scattered residential, commercial, and industrial land uses. Existing noise levels were determined by taking short-term (15-minute) sound-level measurements at three locations in or near the evaluation area. Noise measurement locations were selected to represent areas where people could be exposed to traffic noise for extended periods of time. Noise-monitoring locations are shown in Figure 3-4 below. The measured noise level at each monitoring location (ML) in or near the evaluation area is shown in Table 3.5-3 below.

Figure 3-4. Noise Monitoring Locations



Table 3.5-3. Ambient Noise Levels in or near the Evaluation Area

ID on Figure 3-4	Activity Category at Monitoring Location ^a	Land Use	Location	Measured Noise Level (dBA)
ML-1	B	Residential	Northwest Geneva Road	53
ML-2	B	Residential	580 East 1500 South	55
ML-3	B	Residential	6150 West 11100 West	52

^a See Table 3.5-1 above, UDOT Noise-Abatement Criteria, for a description of activity category B.

Measured noise levels at the monitoring locations were typical of rural and suburban environments and ranged from about 52 dBA to 55 dBA. All measured noise levels were below UDOT's noise-abatement criterion of 66 dBA for residential and recreational locations.

3.5.2 Environmental Consequences

Traffic noise impacts associated with the VC were evaluated by considering the nature of the transportation corridor and the degree of residential development in the project corridor. As described in Section 3.5.1.2, Characteristics of Noise in the Evaluation Area, and as shown in Figure 3-4 above, there is very little residential development within about 500 feet of the proposed VC. As a result, very few sensitive receptors would be affected by the proposed project.

The goal of the noise impact analysis for the Action Alternative was to determine if the predicted noise levels associated with the project would approach or exceed the applicable NAC (66 dBA for residential locations) and/or result in a 10-dBA increase over existing noise levels (a substantial exceedance according to UDOT's criteria). The following methods were used to assess the traffic noise impacts associated with the VC:

- Existing activities, developed land, and undeveloped land for which development is planned were identified from aerial photographs. Existing residential developments were based on field observations and aerial photographs from 2007.
- Short-term sound-level measurements typical of existing conditions were taken along the proposed alignment and were used to characterize the existing noise environment.
- Noise impacts from the proposed project were identified using the criteria specified in UDOT's current noise policy (Policy 08A2-1, January 2008).

Mitigation measures for reducing noise impacts were considered using guidelines for determining feasibility, reasonableness, and cost-effectiveness as described in Policy 08A2-1. Noise abatement would be provided only if UDOT determines that noise-abatement measures are both feasible and reasonable.

3.5.2.1 No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no noise impacts would occur as a result of the project. Ongoing and planned development in the area, including the construction of new roads identified in the RTP and local transportation plans, would continue to affect noise levels in the evaluation area.

3.5.2.2 Action Alternative

Because there is currently no road along most of the project alignment, existing noise levels throughout the proposed Action Alternative corridor are low, ranging from about 52 dBA to 55 dBA. The addition of the VC would increase noise levels throughout the corridor, which would make the noise environment more typical of an urban road. Depending on the distance from the alignment, noise levels would increase by as much as 10 to 15 dBA over existing levels, depending on the proximity to the roadway and other terrain features (for example, berms and absorptive vegetation such as grasses and agricultural crops). Noise levels at residences within about 500 feet of the Action Alternative would likely increase by 10 dBA or more due to the project. As currently proposed, about 20 residences are within about 500 feet of the Action Alternative.

There are no high-density residential developments along the proposed alignment, and none of the scattered rural-residential areas have a high enough density to warrant considering a noise barrier. The existing low-density residential land uses in the project area are separated by large expanses of open space, undeveloped land, agricultural fields, and some industrial developments.

Mitigation Measures for Noise Impacts

Based on existing conditions (very low-density residential) and noise analyses conducted for other transportation corridors in similar low-density residential areas, noise abatement (mitigation) would not be reasonable and/or feasible for the Action Alternative under UDOT's Policy 08A2-1. Building a noise barrier for one or two residences that would reduce noise levels sufficiently to meet UDOT's criterion of a 5-dBA reduction would exceed the maximum amount considered reasonable in Policy 08A2-1, which is \$30,000 per benefiting residence. Typically, more than five residences would need to benefit from a single noise-abatement measure to meet this cost criterion. There are no locations

along the VC where five or more homes would benefit from a noise-abatement measure.

3.6 Vegetation, Fish, and Wildlife

3.6.1 Affected Environment

This section describes the vegetation, fish, and wildlife resources in and near the evaluation area. Because wildlife are mobile, some of the following discussion focuses on areas that are outside the evaluation area but that could be indirectly affected by the project.

3.6.1.1 Regulatory Setting

Endangered Species Act

The federal Endangered Species Act regulates activity that could affect species listed as threatened or endangered under the act. Because the VC project would require authorization under Section 404 of the federal Clean Water Act, USACE, the agency responsible for issuing Section 404 permits, would have to ensure that the project complies with the Endangered Species Act. Section 7 of the Endangered Species Act requires federal agencies to ensure that their actions neither jeopardize the continued existence of species listed as endangered or threatened nor result in the destruction or adverse modification of the critical habitat of these species. Under Section 7, federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) if an action would result in “take” of a listed animal species, where “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect... [an individual of a protected species]” (16 United States Code [U.S.C.] 1532 et seq.).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits the take, sale, purchase, possession, barter, or transport, or offer to do any of the above, of either the bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) at any time or in any manner (16 U.S.C. 668a–d). The Bald and Golden Eagle Protection Act could apply to the VC project if any individual or nest of these two eagle species could be affected.

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act of 1918 with Canada, Mexico, and Japan (16 U.S.C. 703–712) makes it unlawful at any time, by any means, or in any manner, to pursue, hunt, take, capture, kill, or sell migratory birds. The law grants full

protection to any bird parts (such as feathers) and applies to the removal of nests (such as swallow nests on bridges) occupied by migratory birds during the breeding season. This statute applies to all migratory birds in the U.S. with the exception of a few exotic species such as the European starling and house sparrow.

Executive Order 13186, signed by President Bill Clinton on January 10, 2001, directs federal agencies whose activities are likely to have a measurable negative effect on migratory birds to undertake actions in support of the Migratory Bird Treaty Act. One of these actions is for federal agencies to ensure that the environmental analyses required by NEPA evaluate the effects of actions and agency plans on migratory birds, with an emphasis on species of concern. USACE must comply with this Executive Order when it considers all Clean Water Act Section 404 permit applications.

The area within and surrounding the VC project is part of an important migratory flyway for birds in the Intermountain West and provides important migratory stopover habitat for birds traveling north and south. This area also provides nesting habitat for numerous migratory bird species. The VC project could affect migratory bird nests during project construction. If protected species are nesting within the construction zone or buffer zone during construction, UDOT would need to consult with the appropriate authorities in order to comply with the Migratory Bird Treaty Act.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 U.S.C. 661–667e, as amended) states that, whenever construction within the waters or channel of a body of water is planned by a department or agency of the U.S., the department or agency must consult with USFWS and the head of the agency exercising administration over the wildlife resources of the state where construction will occur, with the intent of conserving wildlife resources. The act's purposes include ensuring that wildlife conservation receives equal consideration and is coordinated with other features of water resource development programs. USACE would coordinate with USFWS under this act as part of the Clean Water Act Section 404 permit process.

3.6.1.2 Vegetation, Fish, and Wildlife Resources in the Evaluation Area

The evaluation area is located in a part of Utah County that has historically been used for agricultural production, and more recently the southern portion of this area has been used for commercial and industrial uses such as solid and sewage waste treatment and industrial metallurgy. The conversion of natural habitats to

agricultural and industrial uses during European settlement changed the type and distribution of habitats available for use by fish and wildlife. Recent growth trends in Utah County have contributed to the conversion of undeveloped land to suburban and urban uses and the further fragmentation of natural habitats. As described in Section 3.3, Land Use, cities in the evaluation area expect low-density residential, commercial, and industrial development to continue, especially in the southern half of the evaluation area. Though some residential developments include open space that provides limited natural habitat within their boundaries, these scattered islands of habitat do little to restore the original pre-European-settlement conditions of the area.

Utah Lake, which is south and west of the evaluation area, provides a valuable habitat resource in spite of the historic alterations to the lake. Creeks and ditches that pass through the evaluation area and ultimately connect to the lake have also been substantially altered over the years (for example, creeks have been realigned and routed through pipes).

Several methods were used to collect data on the vegetation, fish, and wildlife resources that could be affected by the VC project. These methods consisted of conducting reviews of previously completed surveys and reports, consulting with agency personnel, and performing field surveys. GIS databases from the Mountain View Corridor and the East-West Connector projects were also used as well as other databases readily available from the State (such as the Natural Heritage Program database). GIS data were verified in the field as necessary. The entire evaluation area was surveyed for sensitive species and habitats as part of the wetland delineation project described in Section 3.7.3, Waters of the United States.

Habitats in the Evaluation Area

Five primary land types were identified as potential habitats for vegetation, fish, and wildlife in and near the evaluation area:

- Open water and riparian
- Wetlands (emergent marsh, forested, and scrub-shrub)
- Pasturelands and farmlands
- Disturbed sites
- Landscaped and developed areas

The vegetation communities in each habitat type are described below.

Open Water and Riparian. The vegetation types typically found in riparian areas along the waterways in the evaluation area, such as Spring Creek, the American Fork River (also known as American Fork Creek), and Grove Creek (also known as Hollow Ditch), are cattails (*Typha latifolia*), bulrushes (*Scirpus* spp.), rushes

(*Juncus* spp.), yellow flag iris (*Iris pseudacorus*), salt-cedar (*Tamarix ramosissima*), Russian olive (*Elaeagnus angustifolia*), willows (*Salix* spp.), Wood's rose (*Rosa woodsii*), common reed (*Phragmites australis*), reed canarygrass (*Phalaris arundinaceae*), box elder (*Acer negundo*), and cottonwoods (*Populus* spp.). The riparian areas in the evaluation area are limited.

Wetlands (Emergent Marsh, Forested, and Scrub-Shrub). Emergent marsh communities, the most abundant wetland type in the evaluation area, are concentrated in the northern and central areas of the evaluation area close to Utah Lake. The vegetation types typically found in emergent marsh areas in Utah County are cattails, bulrushes, rushes, common reed, reed canarygrass, inland saltgrass (*Distichlis spicata*), salt-cedar, Russian olive, willows, and Fremont cottonwood (*Populus fremontii*). Commercial-industrial development along the east shore of Utah Lake has greatly affected this habitat type. Small areas of forested and scrub-shrub wetland habitat types in the evaluation area are located near the southern end of American Fork River and west of the capped landfill in Lindon (see Figure 3-9, Waters of the United States in the Northern Half of the Evaluation Area, and Figure 3-10, Waters of the United States in the Southern Half of the Evaluation Area, on pages 3-73 and 3-74). Vegetation found in forested and scrub-shrub wetlands includes salt-cedar, Russian olive, and willows.

Pasturelands and Farmlands. Pasturelands and farmlands constitute a large portion of the land in the northern part of the evaluation area. Pasturelands inside and outside city and town limits can be used by wildlife for forage, cover, and nesting. A pasture that mostly consists of non-native pasture grasses and invasive weeds, as is the case with most of the pasturelands in the evaluation area, is of much lower value to wildlife than is a pasture with a wide variety of native plants, shrubs, and small trees. The pastureland within the evaluation area varies from maintained, irrigated pasture to weedy, dry, abandoned parcels. The vegetation typically associated with these parcels can include native or introduced grasses (*Agropyron cristatum*, *Festuca pratensis*, *Poa pratensis*, and *Bromus* spp.), various forbs (flowering plants) (*Cirsium* spp., *Kochia scoparia*, *Medicago sativa*, *Trifolium* spp., *Lepidium* spp., and *Sisymbrium altissimum*), shrubs (*Chrysothamnus* spp., *Rhus trilobata*, and *Artemisia tridentata*), and small trees (*Elaeagnus angustifolia*, *Populus* spp., and *Acer negundo*). The pastureland within the evaluation area generally lacks shrubs and trees, and habitats of this type typically have a low value to wildlife.

The farmland areas consist of irrigated crops such as alfalfa, grain, and corn. For the purpose of this analysis, farmland also includes land inside incorporated areas that is used for agricultural production, such as small vegetable plots and turf grass farms.

Disturbed Sites. Disturbed sites within the evaluation area include areas graded for residential and commercial development. The VC evaluation area also includes a very large disturbed area that is associated with the former Geneva Steel plant. This area is currently undergoing remediation and will be redeveloped to a planned community that will support commercial and residential uses. The other disturbed sites are mostly located on abandoned lots and in other areas that have been recently graded, and the sites vary considerably in the mix of species and proportion of bare ground. Disturbed sites most often include cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola pestifer*), kochia (*Kochia scoparia*), two-seed orach (*Atriplex heterosperma*), tumbling mustard (*Sisymbrium altissimum*), thistle (*Cirsium* or *Carduus* spp.), and annual sunflower (*Helianthus annuus*).

Landscaped and Developed Areas. The landscaped areas in residential and commercial developments consist mainly of turf grasses, decorative shrubs, non-native trees and flowers, and cultivated fruit and vegetable species. Landscaped areas are associated with existing homes and businesses that are scattered throughout the evaluation area.

Fish and Wildlife

The types of wildlife species that typically occupy riparian habitats such as that found along the American Fork River are similar to the types found in adjacent habitats such as pasturelands and farmlands. These include common birds such as the American robin (*Turdus migratorius*), song sparrow (*Melospiza melodia*), European starling (*Sturnus vulgaris*), red-winged blackbird (*Agelaius phoeniceus*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), killdeer (*Charadrius vociferus*), yellow warbler (*Dendroica petechia*), and mallard (*Anas platyrhynchos*) (National Audubon Society 2000).

Species of mammals that could be found in the American Fork River riparian habitat include different species of mice (*Peromyscus* or *Perognathus* spp.), voles (*Microtus* spp.), muskrat (*Ondatra zibethica*), mink (*Mustela vison*), beaver (*Castor canadensis*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), and mule deer (*Odocoileus hemionus*).

Invertebrate species, such as insects, are numerous and adequate to support a healthy population of birds and insectivorous mammals.

Additionally, the American Fork River and other waterways such as Spring Creek and Grove Creek provide aquatic habitat in the evaluation area. Some fish species that occur in Utah Lake, but that also could be present in any of perennial flowing waterways in the area, include channel catfish (*Ictalurus punctatus*), yellow perch (*Perca flavescens*), white bass (*Morone chrysops*), largemouth bass

(*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), spottail shiner (*Notropis hudsonius*), and carp (*Cyprinus carpio*) (National Audubon Society 2000). Amphibians that could be present in the aquatic habitats in the evaluation area include green frog (*Rana clamitans*), tiger salamander (*Ambystoma tigrinum*), western chorus frog (*Pseudacris triceriata*), and Woodhouse's toad (*Bufo woodhousii*).

Emergent marsh habitats provide important nesting, young-rearing, and foraging habitat for many mammal and bird species. Mammal species that use this habitat include beaver, muskrat, red fox, raccoon, mink, striped skunk, and many small rodents. Bird species known to be residents of wet meadow/emergent marsh habitats include common species such as red-winged blackbird, yellow-headed blackbird, American robin, black-billed magpie (*Pica hudsonia*), rock pigeon (*Columba livia*), house sparrow (*Passer domesticus*), horned lark (*Eremophila alpestris*), and American crow (*Corvus brachyrhynchos*). Some of the common waterfowl that nest in these habitats include western grebe (*Aechmophorus occidentalis*), great blue heron (*Ardea herodias*), Canada goose (*Branta canadensis*), mallard, gadwall (*Anas strepera*), northern pintail (*Anas acuta*), American coot (*Fulica americana*), and American avocet (*Recurvirostra americana*). Many species of birds could be casual users of this habitat or might hunt in this habitat, such as the marsh hawk (*Circus cyaneus*) and rough-legged hawk (*Buteo lagopus*).

Species that are highly adapted to open spaces around human environments, such as starling (*Sturnus vulgaris*), house sparrow, magpie, northern mockingbird (*Mimus polyglottos*), mule deer, and deer mouse (*Peromyscus maniculatus*), are most likely ubiquitous throughout any disturbed areas, the landscaped areas, and farmlands. Less-common species such as migratory songbirds, raptors, and game animals typically require larger, contiguous tracts of native habitat that might be present near the evaluation area. Bird species that could be found in these remaining habitats include horned lark, western meadow lark (*Sturnella neglecta*), brown-headed cowbird (*Molothrus ater*), scrub jay (*Aphelocoma californica*), and black-billed magpie; upland game birds such as ring-necked pheasant (*Phasianus colchicus*), chukar (*Alectoris chukar*), and California quail (*Callipepla californica*); and raptors such as red-tailed hawk (*Buteo jamaicensis*), kestrel (*Falco sparverius*), and northern harrier (*Circus cyaneus*).

Pasturelands most likely contain some mix of the wildlife species found in all the surrounding habitats described above, from riparian area to disturbed areas. The kinds of species found in pasturelands greatly depend on features such as the diversity of plant species and structure, the degree of disturbance, and the proximity or presence of aquatic habitats such as ponds, creeks, and wetlands.

Special-Status Species

Federally Listed Species

Table 3.6-1 below provides the common and scientific names, status, and probability of occurrence of the federally listed species in the evaluation area. Ute ladies'-tresses (threatened), June sucker (endangered), and yellow-billed cuckoo (candidate) could be present in the evaluation area and are discussed in more detail below.

Ute Ladies'-Tresses (Threatened). Ute ladies'-tresses is a terrestrial orchid that is found along stream banks and on gravel bars usually associated with riparian areas. It can also be found in wet meadows with adequate, spring-fed hydrology. Ute ladies'-tresses is present in 12 watersheds in Utah; there are at least 25 known populations. The total number of individual plants statewide is estimated to be between 6,000 and 46,000, and the species occupies a total habitat area of about 230 acres to 299 acres (Fertig and others 2005).

Ute ladies'-tresses is found in the moist areas, wet meadows, and riparian areas near Utah Lake. Known locations inside the evaluation area could be affected by project construction if any operations occur in its habitat. Because the Ute ladies'-tresses does not flower every year, additional populations that were not counted might be present in the evaluation area.

June Sucker (Endangered). The June sucker, an endangered fish named for its annual June spawning run up the Provo River, is endemic to Utah Lake. This means there are no other places in Utah or the world where June suckers live in the wild. The June sucker numbers have gone from millions in the early 1800s to a natural population of less than 1,000 today (June Sucker Recovery Implementation Program, no date).

The June sucker is known to travel up only the Provo River to spawn, and there are no records for this species in the American Fork River. The Utah Division of Wildlife Resources (UDWR) has planted June sucker in Mill Pond, which is upstream of the evaluation area but is drained by Spring Creek, which passes through the evaluation area. According to UDWR, June sucker stage at the mouth of Spring Creek and might spawn in Spring Creek (Mills 2007).

Table 3.6-1. Federally Listed Species That Could Be Present in the Evaluation Area

Species (Scientific Name)	Status ^a	Probability ^b
<i>Invertebrates</i>		
Utah valvata snail (<i>Valvata utahensis</i>)	E – Extirpated	None
<i>Fish</i>		
June sucker (<i>Chasmistes liorus</i>)	E	Good
<i>Birds</i>		
Yellow-billed cuckoo (<i>Coccyzus americanus</i>) ^c	C	Low
<i>Mammals</i>		
Brown (grizzly) bear (<i>Ursus arctos</i>)	T – Extirpated	None
Canada lynx (<i>Lynx canadensis</i>)	T	None
<i>Plants</i>		
Clay phacelia (<i>Phacelia argillacea</i>)	E	None
Deseret milkvetch (<i>Astragalus desereticus</i>)	T	None
Ute ladies'-tresses (<i>Spiranthes diluvialis</i>) ^c	T	Good

Sources: Mills 2007; UDWR 2007a; USFWS 2007

^a Status definitions:

E = A species that is listed as endangered by USFWS.

T = A species that is listed as threatened by USFWS.

C = A species for which USFWS has on file enough information on biological vulnerability and threats to justify its being a “candidate” for listing as endangered or threatened (but the species is not yet legally protected).

^b Probability definitions:

None = No habitat identified in or near the evaluation area; no known occurrences documented.

Low = Potential for habitat identified in or near the evaluation area; no known occurrences documented.

Good = Habitat identified in or near the evaluation area; known occurrences documented.

^c A federally listed species that was also included in the correspondence from the Utah Natural Heritage Program.

Yellow-Billed Cuckoo (Candidate). Yellow-billed cuckoos were historically common-to-uncommon summer visitors in Utah and across the Great Basin. The current distribution of yellow-billed cuckoos in Utah is poorly understood, although they appear to be an extremely rare breeder in lowland riparian habitats statewide. These birds arrive in late May or early June and breed during late June through July. Cuckoos typically start their southerly migration by late August or early September. Yellow-billed cuckoos are considered a riparian obligate

species (that is, a species that requires riparian habitat) and are usually found in large tracts of cottonwood/willow habitat with dense subcanopies.

Records show that yellow-billed cuckoos were historically present to the west and to the south of the evaluation area. However, there are no records of the species nesting in the evaluation area, and the existing riparian habitat in the evaluation area does not provide suitable nesting habitat for this species.

State Listed Species

State sensitive species that could occur in the evaluation area include the California floater, Bonneville cutthroat trout, leatherside chub, burrowing owl, ferruginous hawk, long-billed curlew, Lewis's woodpecker, and short-eared owl. Table 3.6-2 below provides the common and scientific names, status, and probability of occurrence for each of the state listed species. The probability of occurrence is based on known and recorded accounts of possible residence (that is, courtship, nesting, and rearing of young), but such accounts could also be simple sightings as the species moved through the area. Further explanation of a species' probability of occurrence can be found in the paragraphs below.

California Floater. This invertebrate is thought to be extirpated from its historical habitat in and around Utah Lake, although recent sightings and records are uncertain and lacking. There is confusion in the scientific community as to whether this species has been correctly identified as existing in Utah. The evaluation area is close to the California floater's historic habitat around Utah Lake.

Bonneville Cutthroat Trout. This native subspecies of the cutthroat trout can be found in habitats ranging from high-elevation streams and lakes to lowland grassland streams. The Bonneville cutthroat trout's specific habitat requirements are similar in all sites: a healthy and functional riparian zone that provides cover, shade, and stable banks. In the spring, this subspecies spawns in streams with a gravel substrate and good riparian areas along banks.

There are records of occurrence for this species within 0.5 mile of the evaluation area. However, only very marginal habitat, if any, exists within the evaluation area in either the American Fork River or Spring Creek or in the various large ditch systems such as Grove Creek.

Leatherside Chub. The leatherside chub is a fish that could be present in the American Fork River. Records indicate the presence of this species in the American Fork River in the early 1980s, but no recent surveys (1995–2004) have identified any individuals (Mills 2007). Leatherside chub have never been found in Spring Creek, which is close to but outside of the evaluation area. According to UDWR, leatherside chub is not present in Spring Creek (Mills 2007). No

information is available for any presence/absence records for Grove Creek or its adjoining complex of ditches.

Table 3.6-2. State Species of Concern That Could Be Present in the Evaluation Area

Species (Scientific Name)	Status ^a	Probability ^b
<i>Invertebrates</i>		
California floater (<i>Anodonta californiensis</i>)	SPC	Historical
Southern Bonneville pyrg (<i>Pyrgulopsis transversa</i>)	SPC	Historical
<i>Fish</i>		
Bonneville cutthroat trout (<i>Oncorhynchus clarkia utah</i>)	CS	Low
Leatherside chub (<i>Gila copei</i>)	SPC	Low
<i>Birds</i>		
Burrowing owl (<i>Athene cunicularia</i>)	SPC	Historical
Ferruginous hawk (<i>Buteo regalis</i>)	SPC	Historical
Long-billed curlew (<i>Numenius americanus</i>)	SPC	Low
Northern goshawk (<i>Accipiter gentilis</i>)	CS	Historical
Lewis's woodpecker (<i>Melanerpes lewis</i>)	SPC	Low
Short-eared owl (<i>Asio flammeus</i>)	SPC	Historical

Source: UDWR 2007b

^a Status definitions:

SPC = Special Concern Species, CS = Conservation Species

^b Probability definitions:

Historical = No recent records, only historical; habitat might no longer exist in the evaluation area.

Low = Potential for habitat identified in the evaluation area; no known documented occurrences.

Good = Habitat identified in the evaluation area; known occurrences documented.

Burrowing Owl. Burrowing owls prefer open and level grasslands or low shrublands. The species is closely associated with prairie dog burrows, which it uses for nesting. Records show that burrowing owls have used and nested in areas outside the evaluation area (on the west side of Utah Lake), but there are no records of burrowing owls in the evaluation area.

Ferruginous Hawk. Ferruginous hawks prefer the upland habitat, open grasslands, and shrublands found in the western parts of Utah County. Very little of this upland habitat is located in the evaluation area, and most of it is disturbed and of a much lower quality than the uplands outside the evaluation area. The species' nesting habitat requirements include an abundant source of small

mammals for food and surrounding elevated cliffs or banks for nesting, neither of which is found in the evaluation area.

Long-Billed Curlew. This species forages and breeds primarily in playa habitats such as those surrounding the Great Salt Lake but can also occupy the fallow or abandoned rangelands and pastures of the evaluation area. To provide suitable habitat for this species, these abandoned rangelands and pastures must contain a mix of bare and shady areas within a shorter grass community (less than 12 inches high) and must have enough prey (small vertebrates to large invertebrates). Recent records indicate that this species is present near, but not within, the evaluation area. It is unclear what effect the most recent residential and commercial development will have on the long-billed curlew as more of the abandoned or fallow pastures are developed for housing.

Lewis's Woodpecker. The functional assessment completed as part of the wetland survey of the evaluation area found some suitable habitat for Lewis's woodpecker in the forested wetland habitats. According to UDWR, Lewis's woodpecker is attracted to burned-over Douglas fir, mixed conifer, pinyon-juniper, riparian, and oak woodlands. Secondary habitat for the species includes fringes of pine and juniper stands as well as deciduous forests, especially riparian cottonwoods. Dead trees and stumps are required for nesting (UDWR 2008). There are no recent records of Lewis's woodpecker in the evaluation area.

Short-Eared Owl. This species inhabits Utah during its non-breeding times and typically prefers open grasslands, scrublands, or fields in which it hunts small mammals. The evaluation area includes a large amount of open land that could be used by the short-eared owl, although such habitat is common throughout Utah. There are no recent records of this species in the vicinity of the project.

Other Migratory Birds. In 2002, UDWR began a program called Utah Partners in Flight (PIF) to help reverse the decline of neotropical migratory bird populations. The PIF list provides a single listing for all migratory birds (including raptors) in Utah to better guide conservation efforts. The PIF program has prioritized 24 migratory bird species, called priority species, as those that are most in need of conservation (Parrish and others 2002). The priority species that are found in the evaluation area are American avocet, black-necked stilt (*Himantopus mexicanus*), and broad-tailed hummingbird (*Selasphorus platycercus*).

The American avocet and black-necked stilt have similar habitat requirements. Their nesting and foraging areas in Utah are typically in and around the seasonally inundated mudflats associated with the Great Salt Lake, but these species also use the mudflats around Utah Lake. Both of these species feed on terrestrial and aquatic invertebrates that live in or are attracted to mudflats.

The other priority species, the broad-tailed hummingbird, is known to nest in protected, lowland riparian areas such as those along the banks of Spring Creek, the American Fork River, and possibly Grove Creek. This species feeds on small insects and the nectar of flowers that are common to such areas.

3.6.2 Environmental Consequences

To identify impacts to vegetation, fish, and wildlife and the habitats in which they reside, the following methods were used: information and literature searches, resource agency consultations, and field verification and observations. Basic literature and documented information searches were conducted using internet search engines, library document searches, and state and federal mapping and reports. Results of these searches yielded current documents and information, along with any relevant and available literature.

Consultations with agencies and organizations such as UDWR, USFWS, and the Utah Natural History Program (UNHP) were conducted by e-mail, phone, and individual meetings. During these consultations, the agencies gave their opinions about the likely impacts of the project on common species and their habitats and specific sensitive species and their habitats.

In this section, the term *habitat* refers to an environment that provides the conditions that could support a particular species (such as appropriate roosting habitat for birds or cover for small mammals) but that does not necessarily support individuals of that species. For the analysis in this section, the term *historic*, when applied to species records or occurrences, refers to the period prior to about 1975–1980. The term *recent*, when applied to species records or occurrences, refers to the period from about 1975–1980 to the present.

3.6.2.1 No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no impacts to vegetation, fish, wildlife, or sensitive species would occur as a result of the project. However, ongoing and future residential and commercial development from the expanding urbanization of northern Utah County would likely continue to affect these natural resources.

3.6.2.2 Action Alternative

Habitat Fragmentation

The Action Alternative would pass through wildlife habitats in the impact analysis area. This could fragment wildlife habitat, which could contribute to direct and indirect impacts on wildlife species by reducing the habitat value of the area for species that require large contiguous tracts.

Very limited data are available on the specific habitat use patterns of wildlife species in the impact analysis area. It is not possible, therefore, to provide a detailed analysis of how fragmentation due to the Action Alternative would change the population biology of the local species. However, current research on the measured effects of fragmentation on similar species or species groups in other areas can provide a general indication of the effects that would occur in the impact analysis area (Verboom and others 2001).

GIS analysis was used to evaluate the effects of the Action Alternative on landscape-level fragmentation changes in size and distribution of suitable wildlife habitats. Habitat fragmentation was evaluated by creating maps of habitat types based on aerial photographs and field surveys. The pasture habitat was considered a wildlife habitat because it is used by some species, such as migratory birds, rodents, and deer, for foraging and reproduction. Pasturelands can be considered a poorer-quality version of a mixed meadow since they contain a mixture of open herbaceous vegetation, shrubs, and mature trees. For simplicity, all pasturelands were included regardless of their degree of human disturbance or habitat complexity.

Riparian habitat is a relatively minor constituent in the impact analysis area (0.8 acre). However, because this habitat can provide important migration corridors, the riparian habitat type was also considered in the fragmentation analysis. The riparian habitat would be crossed at the American Fork River using a culvert, which might not be large enough to accommodate all wildlife species that use the corridor.

Highly disturbed lands were not considered because of their low value to wildlife. Highly disturbed lands include those that are a part of the former Geneva Steel plant site and actively plowed and chemically treated agricultural lands (including those treated with pesticides and herbicides).

The remaining habitat type, wetlands (wet or saline meadow and emergent marsh), was included in the fragmentation analysis because it can be foraging habitat for some sensitive species, such as the long-billed curlew. However, any wetlands within the former Geneva Steel plant site were not included in the fragmentation analysis since these wetlands are significantly degraded and disturbed and have minimal wetland function, have interrupted hydrology, and/or were recently affected by the site-remediation activities (HDR 2008d).

Mapped habitat types were classified into “blocks” of large, relatively uninterrupted areas of identical habitat and were digitized into the GIS database. Some of the blocks could contain small internal roads (farm roads) that experience little to no traffic use. Such internal roads were not considered a cause

of fragmentation under existing conditions and were disregarded in delineating the blocks (see Table 3.6-3 and Figure 3-5 below).

Table 3.6-3. Wildlife Habitat Fragmentation Impacts under the Action Alternative

Habitat Type	Block Number	Block Acreage	Block Piece Acreage ^{a,b}
Pasture	1	9	7.5
	2	55	32 / 20
	4	61	45.5 / 6 / 7
	5	36	36
	10	16.5	16.5
	11	39.5	20.5 / 8
Riparian	3	25.5	22.5 / 2.5
	9	2	2
Wetland	6	12.5	12
	7	7	6
	8	3	3
		Existing	With Project
Number of Blocks		11	16
Block Size, Max/Min		61 / 2	45.5 / 2
Block Size, Mean		24	15.5

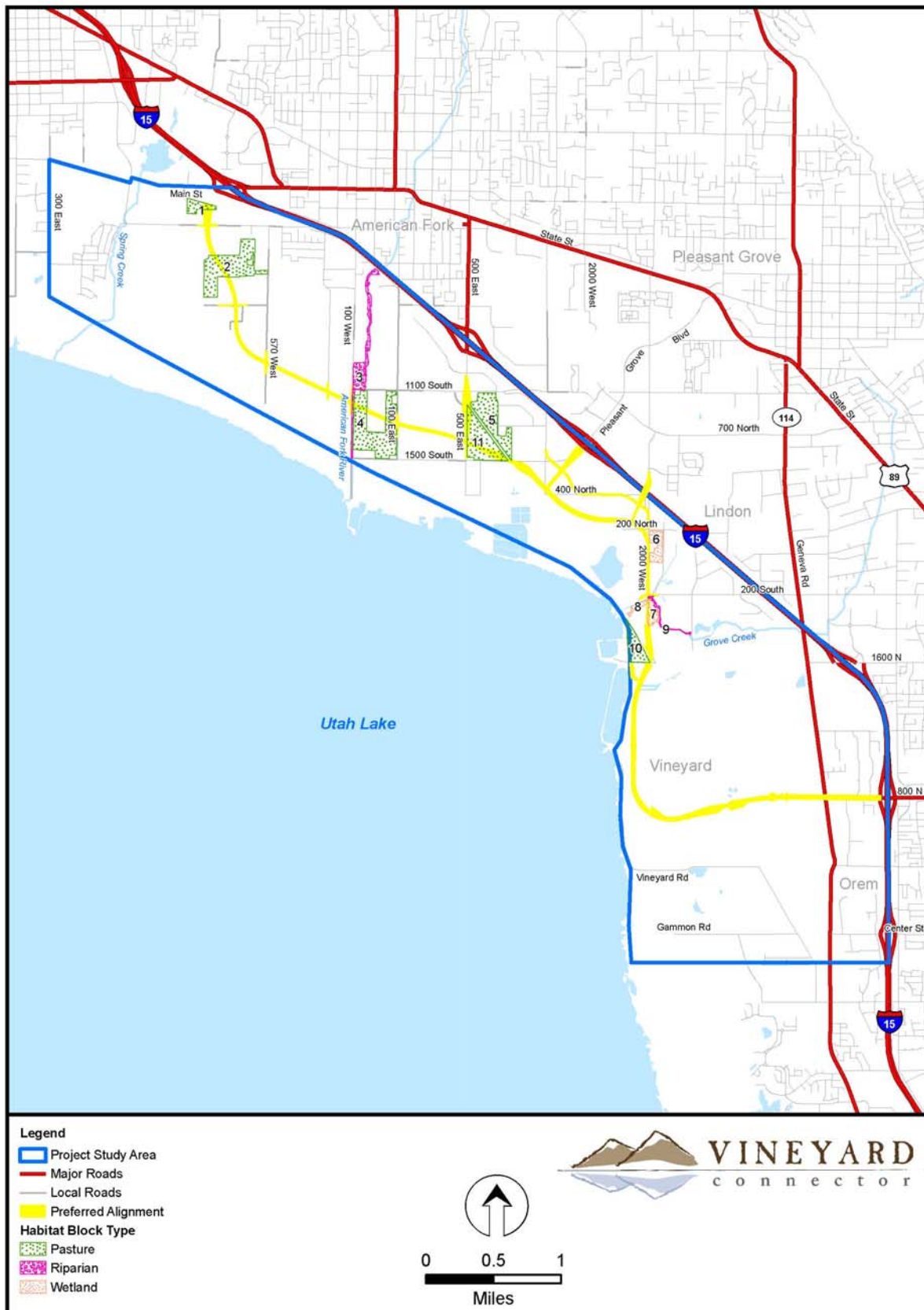
Block totals are calculated beginning at the edge of the evaluation area; however, many habitats continue well beyond the evaluation area.

^a The total block piece acreage might not equal the total block acreage because some of the block acreage was converted to roadway.

^b If block piece acreages do not change from the original block acreage, then the impact was less than 0.5 acre.

In seven out of 11 instances, block sizes would be reduced slightly by the Action Alternative (see Table 3.6-3 above). Three pasture blocks would be divided into seven blocks, while one of the two riparian habitat blocks would be divided into two blocks. None of the wetland blocks would be fragmented, but they would be slightly reduced in size. The Action Alternative would fragment some wildlife habitats, primarily the lower-quality pasture habitat. Since these pastures are agricultural lands, they are subject to land practice changes by the land owner, such as changes in irrigation, conversion to plowed croplands, or being sold for residential or commercial uses (as is much of the agricultural land in northern Utah County). Therefore, the Action Alternative would permanently affect these habitat blocks, but, in most cases, these habitats are of low quality for wildlife and are subject to frequent impacts or future loss.

Figure 3-5. Habitat Fragmentation Analysis Blocks



Vegetation, Fish, and Wildlife Habitats

As described above starting on page 3-31, five primary land types were identified as potential habitat for vegetation, fish, and wildlife in the evaluation area: open water and riparian, wetlands, pasturelands and farmlands, disturbed sites, and landscaped and developed areas.

Open Water and Riparian Areas. The Action Alternative would affect about 0.8 acre of riparian habitat: about 0.7 acre at the road crossing of the American Fork River and about 0.1 acre of herbaceous ditch-side vegetation at the Grove Creek/Hollow Ditch system crossing near 200 South in Lindon. At the American Fork River crossing, the construction of a large box culvert or a 60-inch pipe culvert would remove most of the 0.7 acre of existing riparian (mostly mature tree) habitat on either side of the channel banks. The Grove Creek crossing already contains a culvert that UDOT intends to leave in place; additional impacts to riparian vegetation in this area would be a result of road widening to the north and south of the existing crossing. The actual impact to riparian areas is expected to be less than what was calculated since there is no vegetation in the existing structure footprint at Grove Creek. Any structurally complex, woody riparian habitat associated with Grove Creek farther upstream would not be affected by the Action Alternative.

Wetland Areas (Emergent Wetlands). The Action Alternative would remove 1.43 acres of wetland habitat (palustrine emergent wet meadow and saline meadow) in the area of about 2000 West and 300 South in Lindon and on the former Geneva Steel plant site. These wetlands are most likely remnants of a much larger Utah Lake shore system of wetlands that existed before agricultural and urban development of the area. Impacts from the Action Alternative would be permanent and would reduce the size of the wetlands by a minor amount. Because the Action Alternative would follow an existing road system through most of this area and would run along the boundary of the wetland features (rather than bisecting the features), the VC would not fragment the wetlands further. See Section 3.7.3, Waters of the United States, for more detailed discussion about wetland impacts.

Pasturelands and Farmlands. Within the more general agricultural land type, about 17.5 acres of pasturelands (lands that are currently used as pasturelands and idle farmlands, regardless of future plans or official designations by agencies or local governments) would be directly affected by construction of the Action Alternative. As discussed previously starting on page 3-31, out of all of the agricultural land types, pasturelands have some value for wildlife and could function as wildlife and non-agricultural plant habitat. Any conversion of this land type to road uses would have a small impact on existing native plant and

animal species. In addition to permanent impacts from the loss of pasturelands, native plant and animal species could also be affected by the fragmentation of larger blocks of this habitat into smaller blocks (see the section Habitat Fragmentation on page 3-40).

The project would also convert about 82 acres of actively farmed land (such as croplands and vegetable patches), including farmland within city limits that is designated for future urbanized development but that is not generally considered active farmland by the Natural Resources Conservation Service. However, much of this farmland is regularly disturbed (machine tilled) and in most situations is treated with pesticides, herbicides, and fertilizers, so the loss of such land would have little to no impact on native plant and animal species in those areas.

Disturbed Sites. The impact analysis area has large areas of disturbed sites (primarily within or associated with the former Geneva Steel plant site), about 80 acres of which would be affected by the Action Alternative. Some of these disturbed lands could provide some value to plant and animal species. However, the plant communities in these areas are mostly dominated by invasive and exotic (weedy) species, so their conversion to road use would be a minor loss to native plant and animal communities.

Landscaped and Developed Areas. Construction of the Action Alternative would have a minor impact (about 39 acres) on plant and wildlife species that use landscaped or developed lots as portions of these lots are converted to right-of-way. Because these areas consist primarily of decorative and exotic plant species (where they are not built-up or paved) that can easily be replanted elsewhere, there would be no impact to native plant communities due to the loss of such areas.

Mitigation Measures for Impacts to Vegetation, Fish, and Wildlife Habitats

Constructing the Action Alternative could require mitigation for loss of the two primary native habitats, riparian and wetlands. Although the loss from construction would be permanent, the amount of riparian vegetation removed from the crossings of the American Fork River and the Grove Creek/Lindon ditch system would be a small percentage of the existing habitat, and this loss would not affect the future function of the remaining riparian habitat associated with these two waterways. The riparian areas near the American Fork River that are disturbed by construction will be restored after construction, and this restoration will include planting representative native woody species (willows and cottonwoods) to compensate for the loss of riparian habitat in this area.

As discussed in Section 3.7.3.2, Environmental Consequences, UDOT intends to mitigate for unavoidable wetland impacts through its Northern Utah County mitigation bank, which is currently in development.

No mitigation would be needed for the loss of other land types because they do not provide habitat for native plant and wildlife species, even if these land types are used by native species to some limited extent. UDOT or its contractor will employ standard Best Management Practices (BMPs) throughout the construction areas to prevent the introduction or further proliferation of invasive plant species in the remaining native habitat areas.

Fish and Wildlife

Non-avian Species

Impacts to the various habitats could affect wildlife species that inhabit or otherwise use these areas for forage or travel to other habitats. Overall, many of the habitats affected by the Action Alternative are of a lower quality to wildlife species due to the decades of farming and rural residential use in the area. Therefore, impacts to wildlife species from the construction of the Action Alternative would be limited but measurable, although the effects would be greater if these were pristine, native habitats.

The impacts to mammal species from the Action Alternative would include the loss of about 0.8 acre of riparian habitat and about 1.43 acres of mostly high-quality wetlands (1.18 acres of functional category I and 0.25 acre of lower-quality functional category III) for forage or other uses, 17.5 acres of idle farmland and pasturelands, and about 201 acres of human-manipulated and affected lands (that is, croplands and disturbed, landscaped, and developed lands) of variable quality. However, such losses of marginal and fairly universal habitat compared with the remaining areas of these habitats within the region make these types of losses minor. The more important impact caused by the Action Alternative to local populations of these wildlife species would be further habitat fragmentation, an additional barrier to movement (daily and possibly migratory), additional deaths from roadway strikes on the new road, and overall disturbance by noise, light, and movement. Rigorous and broadly interpretable scientific data on the short- and long-term effects of roadway disturbance on mammal populations are in short supply (FHWA 2007). However, current research on the measured effects of fragmentation on similar species or species groups in other areas can provide a general idea of the likely effects on species in the impact analysis area (Verboom and others 2001). The nearest project for which these fragmentation effects have been analyzed is the Mountain View Corridor. For more information, see Section 15.5, Environmental Consequences, of the Mountain View Corridor Final EIS (FHWA 2008).

With respect to aquatic habitats, such as those found within the American Fork River channel, only minor construction-related impacts are anticipated, since a large box culvert would be used at the crossing and no structures (such as pilings)

would be placed in the middle of the aquatic environment. A small amount of vegetated bank habitat could be lost due to adding the box culvert; however, the existing crossing is a similar structure and therefore the construction would only extend the existing type of culvert. Impacts during construction, such as sedimentation, should be minor and controlled by using BMPs. Other temporary construction impacts, specifically dewatering, should have little effect on the aquatic habitat of the American Fork River if it is conducted during the low- to no-flow times of the year, such as middle to late summer and possibly parts of the winter. However, conditions should return to their preconstruction state shortly after construction, and there would not be any permanent impacts to the aquatic environment.

Mitigation Measures for Impacts to Non-avian Species

Mitigation measures for habitat impacts are discussed on page 3-45. Since no federal or state listed non-avian species are known to be present within the impact analysis area, any impacts to the common non-avian species in the impact analysis area would be temporary and would not require specific mitigation.

Mitigation for any sensitive or special-status aquatic species is discussed on page 3-52. Otherwise, to mitigate effects to common aquatic species, BMPs will be used, such as silt fencing, bank stabilization, hazardous spill protocols, confining construction activities to a minimum amount in aquatic areas, and constructing during low-flow times of the year. If construction takes place when the American Fork River is flowing, UDOT will develop a dewatering plan in coordination with regulating resource agencies.

BMPs will be used during culvert construction to avoid releasing sediment and other materials that could affect fish in the American Fork River or Utah Lake. Any riparian areas along the American Fork River that are disturbed by construction activities will be replanted with representative native woody species (willows and cottonwoods) to prevent any permanent loss of habitat in these temporary impact areas.

Avian Species

Impacts to eagles and other raptors are discussed in the Special-Status Species section below. USFWS has recommended that special attention be given to any birds that could be found in the impact analysis area that are both listed in the USFWS's 2002 List of Birds of Conservation Concern (BCC) and identified as Priority Species by the Utah Partners in Flight (PIF) (Parrish and others 2002). Because the BCC birds are identified as Utah state sensitive species, any BCC and PIF species that could be affected by project construction are discussed in the state-listed part of the Special-Status Species section below.

Most native avian species that are not protected under the Endangered Species Act or the Bald and Golden Eagle Protection Act are protected by the Migratory Bird Treaty Act. For most of the non-special-status avian species found in the impact analysis area, all are fairly common and widespread species, such as the red-winged blackbird, black-billed magpie, house finch, common crow, vesper sparrow, northern mockingbird, and brown-headed cowbird. Those common species that are well adapted to human-influenced environments would experience little or no negative impacts from the construction of the Action Alternative. The only impacts to those species would be to birds nesting within or that typically forage within the project right-of-way. Those birds would be forced go elsewhere for their nesting or foraging needs, both during and after construction. Otherwise, those species outside the project right-of-way could be affected by the Action Alternative from various indirect factors such as habitat fragmentation; increased deaths from vehicle strikes; disturbance from light, sound, and movement; and possibly roadway sound interference with mating and/or territorial calls. Although any or all of these factors could lead to a decline in migratory bird populations over time in the areas surrounding the Action Alternative, the habitats that are being affected by the Action Alternative have already been extensively modified and affected in the past from various land uses and practices.

Mitigation Measures for Impacts to Avian Species

To avoid direct impacts to migratory birds, UDOT or its construction contractor will conduct project-related tree and shrub removal during the non-nesting season (about August 1 to March 30). If trees and shrubs must be removed during the nesting season (April 1 through July 31), UDOT or its contractor will conduct preconstruction surveys of the area that would be disturbed no more than 3 days prior to ground-disturbing activities to determine if active bird nests are present. If active nests are found, the construction contractor will leave them untouched until the young have fledged.

Special-Status Species

Federally Listed Species

Of the eight federally listed species described in the Special-Status Species section above, only three species could be present near or within the project evaluation area: Ute ladies'-tresses, June sucker, and yellow-billed cuckoo. These three species are addressed below, although the smaller impact analysis area is not known to include populations of or suitable habitat for any of these species.

Ute Ladies'-Tresses (Threatened). As a result of a careful survey of both possible new locations for this species and potential habitat within the evaluation

area, a few new populations were found in the northeastern area of the evaluation area. The Action Alternative is far to the south and west of these populations and associated wetland habitats.

Although Ute ladies'-tresses are known to be present in some riverine systems (such as the Diamond Fork River, which is about 85 miles east of the evaluation area), the American Fork River and its associated riparian areas are not good habitat for the species because extensive alterations to the channel, floodplain, and flow regime over the years have caused river flows to drop (sometimes below a measurable flow) and separate from the surrounding water table. This has eliminated cool, oxygenated inputs (such as from springs) from feeding the depositional areas of the river channel. Such oxygenated inputs to these depositional areas are necessary for suitable Ute ladies'-tresses habitat.

The Action Alternative would not affect Ute ladies'-tresses.

June Sucker (Endangered). The June sucker and its associated hybrids are not known to spawn in either the American Fork River or the Grove Creek/Lindon ditch system. The Provo River is the only known spawning river in this part of Utah County (June Sucker Recovery Implementation Program, no date). Because this species is not known to be present in the American Fork River and the Grove Creek/Lindon ditch system, the Action Alternative would not affect the June sucker.

Yellow-Billed Cuckoo (Candidate). The most recent sightings of the yellow-billed cuckoo were in 1996 in the wetland area just south of the Provo City Airport (over 10 miles south of the evaluation area) (UBRC, no date). Only historic sightings, and no recent sightings, have been recorded for the yellow-billed cuckoo in or near the project evaluation area. The only historic potential habitat for this species in the evaluation area would be the riparian areas along the American Fork River; however, the existing riparian corridor along the American Fork River is currently insufficient to provide the required nesting habitat for the species. Therefore, the Action Alternative would have no impact on the yellow-billed cuckoo.

State Listed Species

Four of the nine state listed species described in the Special-Status Species section above are addressed in this section. One of these four species, long-billed curlew, has a low potential to be present in the impact analysis area.

Bonneville Cutthroat Trout. This native subspecies was historically present in many of the rivers and lakes of the Wasatch Front and beyond. However, the closest connected population of the Bonneville cutthroat trout exists in the American Fork River in American Fork Canyon. There is no longer any potential habitat for this species downstream of the mouth of American Fork Canyon

(USFWS 2001, 76) due to extensive channelization and other impacts to the tributaries of the American Fork River. As a result, no habitat or populations of this species remain within the impact analysis area for the Action Alternative. Therefore, the Action Alternative would not affect the Bonneville cutthroat trout.

Leatherside Chub. The most current historic (early 1980s) records relating to the impact analysis area have documented this fish species in the American Fork River (Mills 2007). However, since then (1995–2004), recent surveys by UDWR have not documented this species in the American Fork River. It is likely that prolonged drought or human-made hydrological changes have changed the flow regime such that at least the lower sections of the river no longer support the leatherside chub. Since the American Fork River would be crossed with a culvert under the Action Alternative, no structures in the river channel would block fish passage, so the Action Alternative would have no impact on the leatherside chub.

Lewis's Woodpecker. Even though this species has not been seen in the evaluation area, the functional assessment completed for the evaluation area stated that forested wetland habitats could support Lewis's woodpecker. The Action Alternative would not affect any forested wetlands and so would not affect any potential Lewis's woodpecker habitat. Construction of the VC would not affect Lewis's woodpecker.

Long-Billed Curlew. This species is known to forage and nest in pasturelands or other similar upland areas that are closely associated with large wetland complexes, such as those found along the eastern shores of the Great Salt Lake (Parrish and others 2002). The Action Alternative would affect 17.5 acres of pasturelands and 1.43 acres of wetland. However, only a small portion of that acreage could be potential habitat, including pastures that are surrounded by undeveloped areas and that are close to healthy wetlands that can support an abundant small vertebrate and invertebrate prey base. Considering the encroachment of development into previous agricultural lands in the northern and eastern shores of Utah Lake, it seems unlikely that the remaining pastures would be acceptable for nesting to the long-billed curlew in recent or future years (HDR 2007a).

The impact analysis area could have some limited foraging grounds along with a low potential for nesting for the long-billed curlew. However, because the eastern shore of the Great Salt Lake (about 50 miles to the north), including Antelope Island, is the focal point for the nesting habitat for this species in Utah, the Action Alternative could affect, but is not likely to adversely affect, the long-billed curlew.

Other Migratory Birds. The three species on the PIF list are American avocet, black-necked stilt, and broad-tailed hummingbird. For both the American avocet

and the black-necked stilt, it is unlikely that the Action Alternative would have any effect on the species. The few saline meadow/emergent marsh wetland habitats (in the 2000 West/300 South area) that would be affected probably do not constitute nesting or critical foraging habitat due to their small size, lack of long-term inundation, and surrounding urbanized disturbance.

The construction and operation of the Action Alternative in riparian areas could have a small effect on the broad-tailed hummingbird, either by disrupting nesting if construction occurs during the nesting season or by permanently removing the affected acreage from use by this species for nesting in subsequent years.

However, the riparian habitat impacts would be very minor since the existing habitat is already very narrow and might not provide valuable nesting habitat for the broad-tailed hummingbird. As with other species, the constructed roadway could act as a barrier, could increase the risk from vehicle strikes, and/or could deter hummingbirds from nesting in the area because of sound or light disturbance from vehicle traffic.

Other Protected Species

The Bald and Golden Eagle Protection Act, along with the Migratory Bird Treaty Act, regulates impacts that could threaten any raptors, including bald and golden eagles, various hawks, and falcons. Impacts could include direct impacts due to bird deaths and removal of nests and indirect effects from disturbance (such as noise, light, and movement) that could threaten the survival of young birds in the nest. Although it is unlikely that any eagles are nesting within the project right-of-way or within the 0.5-mile prescribed nesting spatial buffer, both species do nest in Utah and therefore were considered. There is a greater (but still small) chance that a more common raptor, such as the red-tailed hawk, could nest within or close to the project right-of-way and could therefore be affected by noise and motion from construction. Many of these more common raptor species also have prescribed spatial buffers, though typically they are less than the 0.5 mile used for more sensitive raptor species (such as eagles and falcons).

Mitigation Measures for Impacts to Special-Status Species

State Listed Species. To avoid any impacts to possible nesting long-billed curlews within the VC right-of-way, UDOT will conduct preconstruction surveys of long-billed curlew habitat along the alignment if clearing and construction will occur during the courtship and nesting season of the year (about April 1 through June 30). If any nesting long-billed curlews are located during this time, any right-of-way clearing will be delayed until after about June 30, when the young chicks have hatched and are mobile, at which time the family units move to other areas for feeding. Alternatively, the clearing and construction could occur between July 1 and March 31 without preconstruction surveys, which would avoid any impacts to nesting long-billed curlews.

Other Protected Species. If clearing and grubbing and construction would take place between February 1 and June 30, UDOT will conduct raptor surveys within 0.5 mile of the VC right-of-way to be sure that the area is clear of raptor nests that could be affected by construction. If any active raptor nests are found within the survey area, a biologist will determine the potential for affecting the nesting raptors, and construction within 0.5 mile of the nest(s) will be delayed (if necessary) or monitored to ensure that nesting raptors are not adversely affected by construction. If construction would take place between July 1 and January 31, clearing and grubbing and construction could be conducted without preconstruction surveys.

3.7 Water Resources

This section addresses floodplains, water quality, and waters of the United States in the evaluation area.

3.7.1 Floodplains

Floodplains are defined as normally dry areas that are occasionally inundated by stormwater runoff or high lake water. Development in floodplains can reduce their flood-carrying capacity and extend the flooding hazard beyond the developed area.

Some of the waterways and water bodies in the VC evaluation area have regulatory floodplains (that is, a floodplain recognized by the Federal Emergency Management Agency [FEMA] and adopted by the local community). The runoff that affects the evaluation area originates in the mountains north and east of the evaluation area in Utah County. The floodplain analysis area is the same as the VC evaluation area.

3.7.1.1 Affected Environment

Regulatory Setting

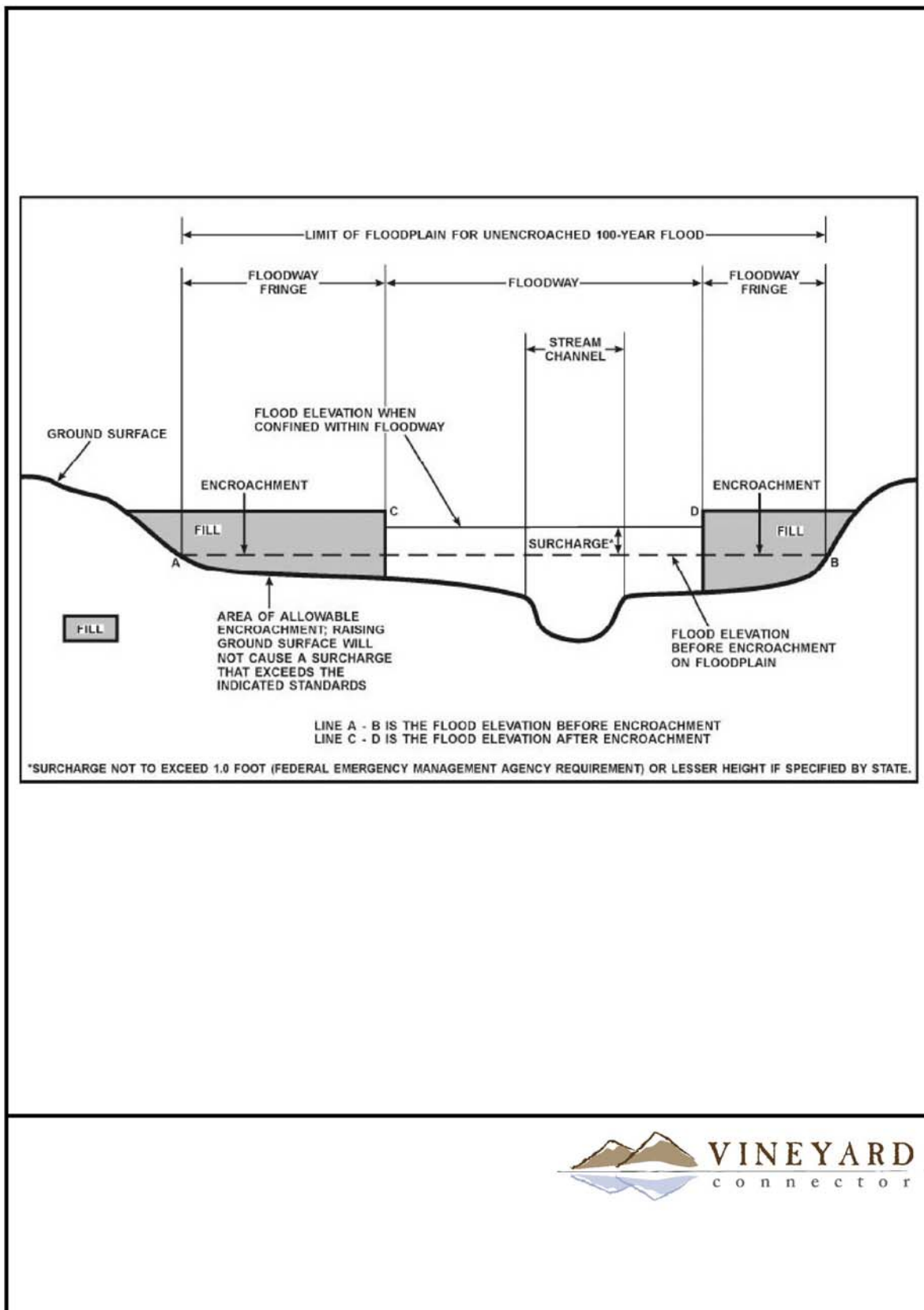
Federal Emergency Management

In response to escalating taxpayer costs for flood disaster relief, Congress established the National Flood Insurance Program. This program is a voluntary mitigation program administered by FEMA. Under this program, the federal government makes flood insurance available in those communities that practice sound floodplain management. This incentive encourages state and local governments to develop and implement floodplain management programs.

In the 1980s, FEMA performed location hydrologic and hydraulic studies to identify and map special flood hazard areas within communities. These FEMA studies resulted in the development of flood insurance rate maps that show the floodplain for each river, lake, or other surface water resource that was studied. A special flood hazard area is the area that would be inundated by a 100-year flood. The 100-year flood is defined as a runoff event with a 1% chance of occurring in any given year. Special flood hazard areas are assigned a zone designation based on the level of detail of the FEMA study and the anticipated type of flooding. The zone types listed below are relevant to the VC project.

- **Zone A** – Areas subject to inundation by a base flood. (A base flood is a flood with a 1% chance of occurring in any given year and is commonly referred to as a 100-year flood.) These areas are identified by approximate studies, and no base elevations are established.
- **Zone AE** – Areas subject to inundation by a base flood as determined by detailed methods. Base flood elevations are established. As described below, a Zone AE floodplain consists of the floodway (FW) and the floodway fringe (FEMA 2006).

The 100-year floodplain for rivers and streams is the area in and around the river or stream that would be inundated by a 100-year flood. In AE zones, this floodplain can consist of both the floodway and the floodway fringe as shown in Figure 3-6 below (FEMA 2007). The floodway is the defined stream channel and the adjacent areas that must be kept free of encroachment to pass the 100-year flood without increasing the water surface elevation more than a designated height. The floodway fringe is the area between the floodway and the boundary of the floodplain. Similarly, the 100-year floodplain for lakes and reservoirs is the area in and around the lake or reservoir that would be inundated by a 100-year flood.

Figure 3-6. Floodway Schematic

Executive Order 11988, Floodplain Management

Executive Order 11988, Floodplain Management (May 24, 1977), established federal policy “to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.” Even though the VC is not a federally funded project, federal actions such as issuing a Clean Water Act Section 404 permit would require compliance with Executive Order 11988.

Floodplains in the Evaluation Area

Streams in the evaluation area convey stormwater runoff, but not all of these waterways have a regulatory (defined) floodplain boundary. To identify streams and floodplains, information was gathered from a variety of sources including FEMA’s Community Status Book (FEMA 2008), flood insurance rate maps, digital (Q3) flood data, and U.S. Geological Survey topographic maps.

To evaluate the affected environment, the project team developed an inventory of the streams in the evaluation area. Because FEMA’s flood insurance program and flood hazard data are organized by local (city and county) jurisdictions, the first step in creating the stream inventory was to identify the communities in the evaluation area. Next, streams and water bodies within the affected communities were identified. Note that, in this discussion of floodplains, *stream* is used as a general term to describe waterways such as rivers, creeks, and canals. These waterways can be perennial (containing water year-round) or intermittent (wet only part of the year). The inventory includes streams that do not have a regulatory floodplain (that is, a floodplain shown on a FEMA flood insurance rate map). Unless they have a regulatory floodplain, canals and ditches are not included in the inventory; rather, these features are addressed in Section 3.7.3, Waters of the United States.

The evaluation area includes portions of Lehi, American Fork, Lindon, Vineyard, and Orem as well as unincorporated areas of Utah County. With the exception of the Town of Vineyard, these communities participate in the FEMA flood insurance program. Table 3.7-1 below lists the community identification number for each community.

Table 3.7-1. Communities Participating in the FEMA Flood Insurance Program in the Evaluation Area

Community	FEMA Community Number (CID)
Lehi	490209
American Fork	490152
Lindon	490210
Orem	490216
Utah County	495517

Source: FEMA 2008

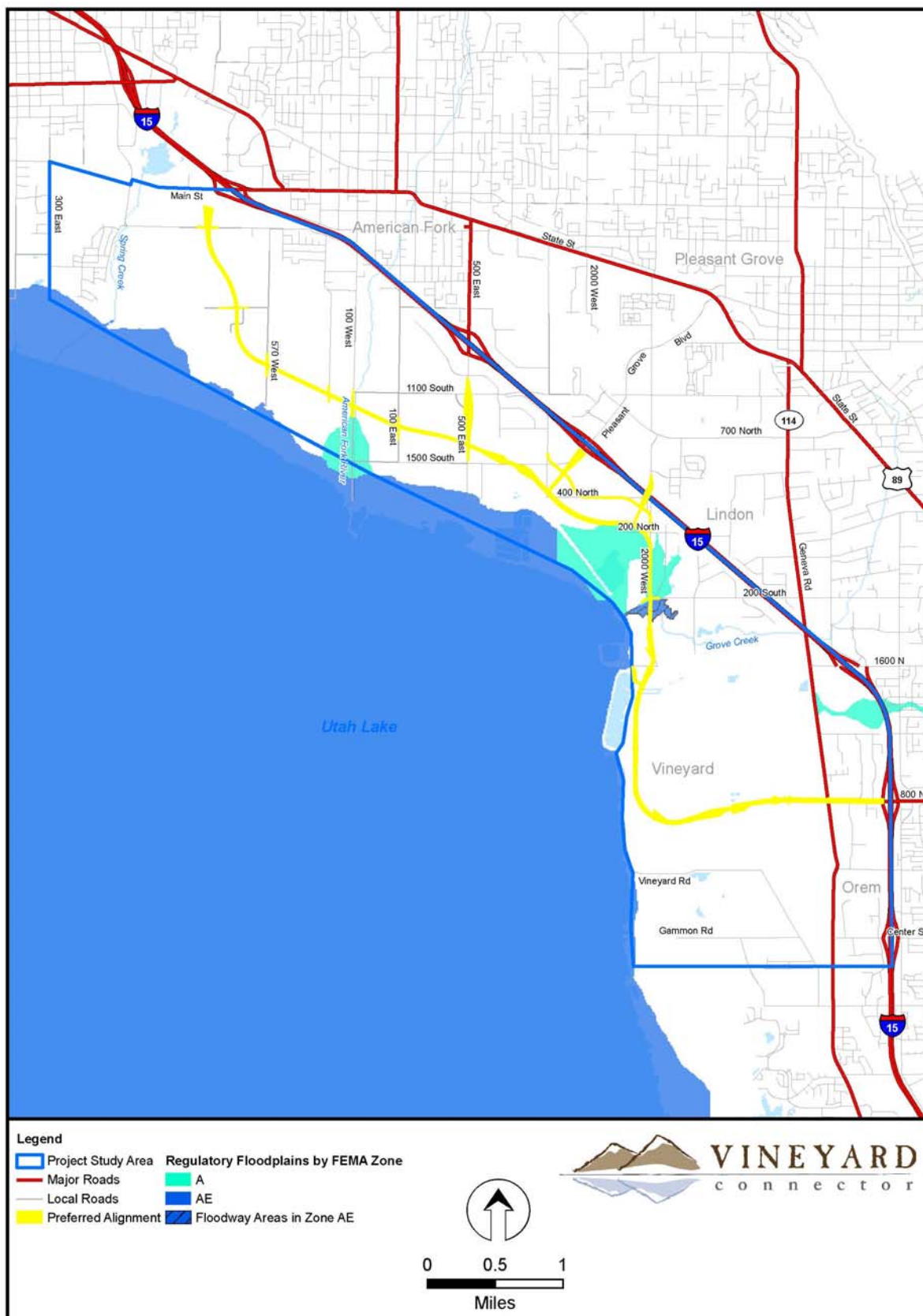
The regulated streams and water bodies in the evaluation area are described below and are summarized in Table 3.7-2. These streams and water bodies are shown in Figure 3-7 below.

Table 3.7-2. FEMA-Regulated Streams and Water Bodies in the Evaluation Area

Stream/Water Body	Description
Utah Lake	The Utah Lake floodplain encroaches on portions of the evaluation area. The floodplain boundary is roughly parallel to the lake boundary but extends northward at the mouth of the American Fork River and eastward in Lindon.
Spring Creek	Spring Creek enters the evaluation area at 800 North and runs to the south-southwest. The creek has no regulatory floodplain in the evaluation area.
American Fork River	The American Fork River enters the evaluation area near I-15 and 400 South (in American Fork) and flows south toward Utah Lake. South of I-15, the only regulatory floodplain along the American Fork River is at its mouth.
Grove Creek (also known as Hollow Ditch)	Grove Creek enters the evaluation area between 200 South (Lindon) and 1600 North (Orem) and flows west toward Utah Lake. The Utah Lake floodplain includes a downstream portion of Grove Creek.

Sources: FEMA 2002; Utah AGRC 2008

Figure 3-7. FEMA Floodplains in the Evaluation Area



Utah Lake. At about 96,600 acres, Utah Lake is the largest freshwater lake in Utah. The Provo, Spanish Fork, and American Fork Rivers are the primary tributaries to Utah Lake. Utah Lake is critical to farming in the Salt Lake Valley; several canal companies divert water from the lake or, under low-water conditions, from the Jordan River at the pumping station in Lehi.

FEMA-issued maps show the 100-year flood elevation of Utah Lake at 4,495 feet (FEMA 2002). Portions of the Utah Lake floodplain encroach on the evaluation area. The floodplain boundary is roughly parallel to the lake boundary with a couple of notable exceptions: the floodplain extends northward at the mouth of American Fork River, and the floodplain extends eastward in Lindon.

Spring Creek. Spring Creek originates in American Fork and drains portions of Utah County and Lehi before entering Utah Lake. The stream conveys natural spring water, and its water is used for irrigation.

American Fork River. The American Fork River runs through Utah County, Highland, and American Fork as it flows from the Wasatch Mountains to Utah Lake. It has a natural V-shaped channel and is used for irrigation during the summer, which limits the river's downstream flow. The river travels in a southerly direction through the evaluation area, and a regulatory floodplain is defined at its mouth.

Grove Creek. Grove Creek originates in Lindon and travels west through the evaluation area in Lindon and Vineyard. The Utah Lake floodplain includes a downstream portion of Grove Creek.

3.7.1.2 Environmental Consequences

Impacts from the Action Alternative were determined by comparing digital (GIS) stream data and flood insurance rate maps to the right-of-way to identify stream crossings and to quantify the regulatory floodplain area affected. The Utah County flood insurance rate maps used for the analysis are dated July 17, 2002. These maps were not readily available in a digital format, and a visual comparison between current maps and 1996 digital floodplain (Q3) data showed differences in the Jordan River and Utah Lake floodplains. Therefore, 2002 flood insurance rate maps were georeferenced, and floodplains were digitized. Although minor imperfections are inherent in the georeferencing and digitizing process, the quantified impacts are more accurate than those that could have been obtained from the 1996 digital floodplain data.

No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no impacts to floodplains would occur as a result of the project. However, ongoing and future residential and commercial development from the expanding urbanization of northern Utah County would likely continue to affect floodplains.

Action Alternative

The Action Alternative would cross regulatory floodplains at the American Fork River in American Fork and near 200 South in Lindon where the Utah Lake and Grove Creek (also known as Hollow Ditch) floodplains converge. The American Fork River floodplain impacts would be a result of improvements to American Fork 100 West south of the mainline VC. The Grove Creek impacts would be the result of modifications to an existing pipe culvert at Lindon 200 South and construction near the eastern edge of the Utah Lake regulatory floodplain between Lindon 200 North and 200 South.

Construction in these regulatory floodplains would result in direct effects to 6.76 acres of Zone A, and 1.44 acres of Zone AE, regulatory floodplain. The design of the structure crossing Grove Creek would follow the UDOT Manual of Instruction and FEMA requirements, where applicable, to determine the design flow. The structure would be designed so that the resulting flood elevations are not increased and resulting floodplain boundaries do not change.

The Action Alternative also crosses the Utah Lake floodplain longitudinally near the capped landfill. This impact cannot be avoided due to shallow topographic relief, a narrow corridor through which the road could be placed, and constraints related to existing land uses (such as the landfill and power plant).

Mitigation Measures for Impacts to Floodplains

If necessary, UDOT or its construction contractor will obtain floodplain development permits for the segment(s) of the proposed roadway that would encroach on the regulatory floodplain of the American Fork River, Utah Lake, and Grove Creek. The culvert structure at Grove Creek will be designed to meet the more stringent of FEMA requirements or local floodplain ordinances.

UDOT or its construction contractor will obtain a stream alteration permit from the Utah Division of Water Rights for crossings of waters of the state, including the American Fork River and Grove Creek. UDOT or its construction contractor will file a General Permit application with the Utah Division of Forestry, Fire, and State Lands to obtain an easement over and/or upon the stream beds.

Roadway elevations will be above adjacent floodplain elevations of the American Fork River and Grove Creek so that flooding will not interfere with a transportation facility needed for emergency vehicles or evacuation. For impacts to the Utah Lake floodplain, UDOT will continue to evaluate drainage and floodplain connectivity issues with the intent of minimizing or avoiding impacts that would worsen local flooding conditions.

The Action Alternative will cross several drainage ditches that are not regulated by FEMA. For these crossings, UDOT will use the *UDOT Manual of Instruction – Roadway Drainage* (UDOT 2005) to determine the design flow for the structures (that is, the flow that the structure will be designed to accommodate).

3.7.2 Water Quality

This section describes the existing conditions of surface water and groundwater in the evaluation area. The water quality analysis area includes the evaluation area, adjacent water bodies such as Utah Lake, and associated watersheds. The main water bodies of importance in the evaluation area are Utah Lake, Spring Creek, and the American Fork River.

3.7.2.1 Affected Environment

Regulatory Setting

Water quality in Utah is regulated through numerous laws that are applied by EPA and the Utah Divisions of Water Quality and Drinking Water. These regulations are summarized in Table 3.7-3 below.

Table 3.7-3. Water Quality Regulations That Apply to the Vineyard Connector Project

Regulation	Regulatory Agency and Requirement	Applicability
Clean Water Act Section 401 State Water Quality Certification	EPA requires the Utah Department of Environmental Quality (UDEQ) to certify that the project would not cause water quality standards to be exceeded.	Water Quality Certification Issuance of Section 404 authorization requires Section 401 certification.
Clean Water Act Section 402 (UAC R317-8) NPDES Permit (UPDES in Utah) (Limits discharges)	EPA has delegated authority for the National Pollutant Discharge Elimination System (NPDES) program in Utah to UDEQ. Industrial projects that discharge stormwater to surface water and construction projects that disturb more than 1 acre of land must obtain a Utah Pollutant Discharge Elimination System (UPDES) permit to minimize impacts to water quality.	UPDES Permits Required for roadway construction that disturbs more than 1 acre.
Clean Water Act Section 303(d) Total Maximum Daily Load for Impaired Waters (Limits discharges)	EPA requires the Utah Division of Water Quality to identify water bodies that do not meet state water quality standards and therefore do not support their designated beneficial use. The Division submits a 303(d) list of these impaired waters to EPA biannually. The Division conducts a Total Maximum Daily Load analysis on the impaired waters to determine the maximum contaminant load that the water body can accept and still meet the standards. The Division then assigns point-source dischargers (UPDES permit-holders) a numeric limit for the maximum amount of particular pollutants they can discharge based on the Total Maximum Daily Load analysis.	Impaired Waters A Total Maximum Daily Load analysis is currently in progress for Utah Lake (Utah Division of Water Quality 2008). There are no other 303(d)-listed waters in the evaluation area.
UAC R317-2-7.2 Narrative Water Quality Standards (Limits discharges)	This regulation states that it is unlawful to discharge substances that could cause undesirable effects on human health or aquatic life into surface waters.	Narrative Standards Applies to all surface waters near the evaluation area.
UAC R317-2-14 Numeric Criteria (In-stream standard)	Numeric standards for water quality are based on the beneficial use, such as providing drinking water, supporting game fish, or swimming. Projects cannot cause water quality standards to be exceeded. If a standard is already being exceeded, a Total Maximum Daily Load limit could be applied to the project.	Numeric Standards Project-related discharges cannot exceed the current numeric standard.
UAC R309-605 Drinking Water Source Protection for Surface Waters (Regulates activities near drinking water sources)	Owners of public surface water systems are responsible for protecting sources of drinking water and for submitting a Drinking Water Source Protection Plan to the Utah Division of Drinking Water. Project work near protected sources must not violate adopted plans.	Source Protection There are four protected sources in the evaluation area.
UAC R309-600 Drinking Water Source Protection for Groundwater	Owners of public groundwater systems are responsible for protecting sources of drinking water and for submitting a Drinking Water Source Protection Plan to the Utah Division of Drinking Water. Project work near protected sources must not violate adopted plans.	Source Protection The Utah Division of Water Rights identifies numerous public (municipal) diversions in the evaluation area.

Water Quality in the Evaluation Area

The following discussion addresses surface waters and beneficial-use classifications, impaired waters, groundwater, and drinking water. High-quality waters are not addressed, since there are none in the evaluation area.

The information presented below is based on information from Utah state water plans, the Clean Water Act 303(d) list, and other data collected from UDEQ's Divisions of Drinking Water, Water Rights, and Water Quality.

Surface Waters and Beneficial-Use Classifications in the Utah Lake Watershed

The evaluation area lies within the Utah Lake watershed. This watershed includes all of the land that drains into Utah Lake and that portion of the Jordan River from the Utah Lake outlet downstream to the Jordan Narrows.

Surface water provides 62% of the developed water supply in the watershed. Most of the developed water supply is used for agricultural irrigation. However, due to urban expansion, water is transferred from agricultural to urban uses (Utah Division of Water Resources 1997). Table 3.7-4 summarizes surface waters in the Utah Lake watershed and their beneficial-use classifications.

Table 3.7-4. Surface Waters and Beneficial Uses in the Evaluation Area

Watershed	Water Body ^a	Beneficial Uses
Utah Lake (16020201)	Utah Lake	2B (secondary contact), 3B (warm-water fish species), 3D (waterfowl), 4 (agriculture)
	Spring Creek	1C (drinking water), 2B (secondary contact), 3B (warm-water fish species), 4 (agriculture)
	Lindon Hollow Creek (also known as Grove Creek)	2B (secondary contact), 3B (warm-water fish species), 4 (agriculture)
	American Fork River ^b	2B (secondary contact), 3A (cold-water fish species), 4 (agriculture)

Source: UAC R317-2-13, Classification of Waters of the State, last updated October 2, 2007

^a For the surface waters listed, the beneficial use includes the entire water body reach.

^b Also known as American Fork Creek.

In addition to the waterways listed above, there are numerous canals and irrigation ditches in the evaluation area. These canals and ditches, and any others that are not specifically designated in UAC R317-2-13, use the default beneficial use classifications of 2B (secondary contact) and 3D (waterfowl) (UAC R317-2-13 and R317-2-14). The narrative standard also applies to these waters.

Impaired Waters

According to UDEQ, the major activities that cause water quality impacts to the Jordan River and Utah Lake are resource extraction, habitat modification, stream modification, agricultural activities, and urban stormwater runoff (Utah Division of Water Quality 2002).

Utah Lake does not meet the numeric standards for beneficial-use classification 3B (warm-water species of game fish) due to high levels of total phosphorous and total dissolved solids (Utah Division of Water Quality 2004). High levels of phosphorous can come from fertilizers, from sediments that have eroded from hillsides, or from sediments that have eroded from high-velocity streams.

A stretch of the American Fork River between an existing diversion point at the mouth of American Fork Canyon to Tibble Fork Reservoir is identified as impaired due to its pH level. This stretch of American Fork River is outside the evaluation area.

Groundwater

Groundwater provides about 38% of the presently developed water supply in the Utah Lake watershed (Utah Division of Water Resources 1997). There are five groundwater subbasins in the Utah Lake groundwater basin. The groundwater subbasin that intersects the evaluation area is the Utah–Goshen Valley basin.

The groundwater quality of the Utah–Goshen Valley basin meets all state and federal standards for culinary use. The highest-quality groundwater is found nearest the major sources of recharge along the east side of the basin. Of the two areas in the basin that have degraded water quality, one is in the evaluation area along the northwest shore of Utah Lake extending north along the Jordan River to the Jordan Narrows. The groundwater in this area is classified as slightly to moderately saline; the higher saline concentrations in these areas might be caused by water that rises along a north-south-trending fault (Utah Lake Fault) in the area (Utah Division of Water Resources 1997).

Groundwater in the evaluation area consists of a deeper confined aquifer and a shallow aquifer. The groundwater gradient moves generally south toward Utah Lake. Groundwater depths immediately north of Utah Lake are just below the surface, and several springs have been identified near the Pleasant Grove/I-15 interchange. Groundwater flows are also located near the surface along the southern termini of American Fork River and Spring Creek.

According to the Utah Division of Drinking Water, no aquifers are classified as protected in the evaluation area (Herbert 2004). The Utah–Goshen Valley groundwater subbasin was closed to new appropriations in November 1995.

Points of Diversion and Public Water Sources

The points at which water is extracted for use by both private and public parties are called *points of diversion*. The Utah Division of Water Rights records permitted points of diversion from both surface and groundwater.

Figure 3-8 and Table 3.7-5 below summarize the permitted groundwater and surface diversions in the evaluation area. The surface points originate from springs, sloughs, ditches, and drains.

There are four public water sources with established source protection zones in the evaluation area: two west of the Geneva Road/1600 North intersection in Orem, one at the former Geneva Steel plant site, and one just east of the intersection of 860 East and 1300 South in American Fork (Jensen 2008). Local governments typically include information about drinking water source protection in their city or county codes.

Figure 3-8. Points of Diversion in the Evaluation Area

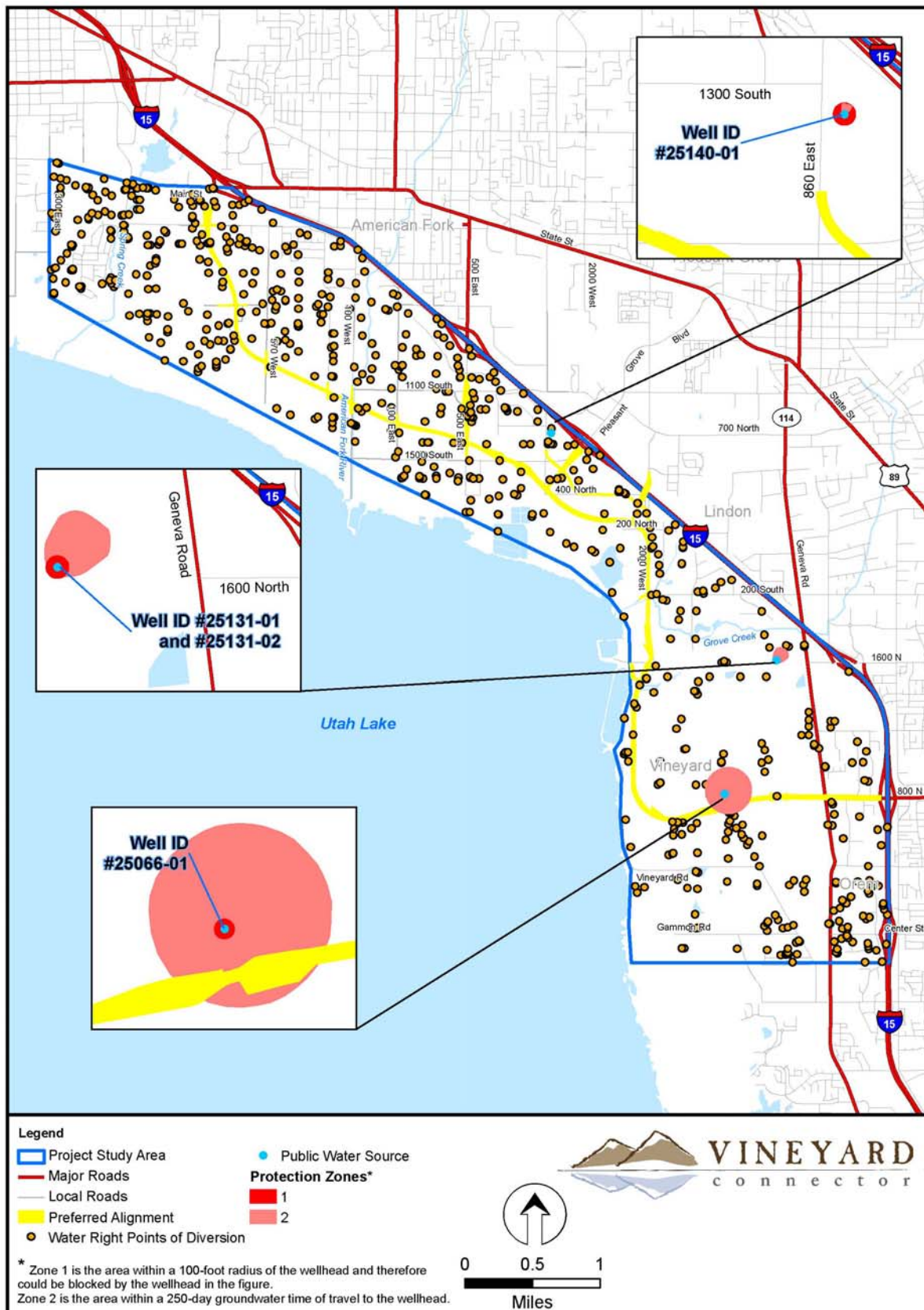


Table 3.7-5. Permitted Active Points of Diversion in the Evaluation Area

Water Source	Type of Use ^a	Number of Diversions	Water Source	Type of Use ^a	Number of Diversions
Surface	DI	1	Underground	D	8
	DIS	10		DI	40
	I	108		DIMS	1
	IO	2		DIO	4
	IOS	1		DIOS	5
	IS	125		DIS	116
	O	3		DO	1
	S	3		DOS	2
	Total	253		DP	28
Other ^b				DS	9
	Abandoned well	10		I	236
	Drain			IM	5
				IO	7
				IOS	1
	Rediversion			IS	152
				M	55
				MS	1
	Return			O	45
				OS	2
	Total	63		S	13
				Not identified	36
			Total		767

Source: Utah Division of Water Rights 2008

^a Type of use: D = domestic; I = irrigation; M = municipal; O = other; S = stock watering; X = mining^b Other definitions:

- Drain: An excess-water collection system from which a point of diversion is established.
- Rediversion: A diversion that diverts water that was previously diverted and released upstream.
- Return: A point where non-consumptive water is returned to the natural stream.

3.7.2.2 Environmental Consequences**No-Action Alternative**

Under the No-Action Alternative, the VC project would not be built. Residential, commercial, and other development in the water quality impact analysis area will continue over the next 20 years and beyond. The need for transportation and related infrastructure, including roads, bridges, and culverts, will accompany this development. This will increase the amount of impervious area, change runoff characteristics, and potentially degrade water quality.

Action Alternative

Methods Used To Identify Impacts

Impacts to water quality were determined by reviewing the following information:

- **The amount of impervious (paved) surface area added.** Additional impervious area from roadway pavement affects water quality in two main ways. First, impervious surfaces can accumulate pollutants such as total suspended solids (TSS) and total dissolved solids (TDS). These pollutants can be washed off the road during storm events and can affect the quality of receiving waters. Secondly, additional impervious surface area increases the amount of runoff relative to open spaces. This increased runoff contributes to increased flows in receiving waters, which can increase stream velocity and the potential for erosion. This erosion can also contribute to increased TSS or TDS concentrations in receiving waters.
- **An in-stream numerical analysis of typical roadway runoff pollutants using FHWA's methodology.** The water quality impact analysis also considers the results of a water quality modeling exercise from the Mountain View Corridor project in the same watershed (FHWA 2008).

Impervious Area Added

The Action Alternative would add about 122 acres of new impervious (paved) surface. UDOT is proposing to incorporate retention and/or detention features into the project. The exact locations and sizes of the retention and/or detention features would be determined as project planning progresses. These features would be designed to capture excess runoff from the impervious roadway surface and reduce the flow rate of the runoff into adjacent water bodies. These features would help minimize erosion in the receiving stream and treat stormwater runoff quality by allowing pollutants to settle out of the runoff. These stormwater features would be placed outside of existing wetland areas.

Beneficial Uses and Impaired Waters

There are no 303(d)-listed impaired waters in the impact analysis area. The closest impaired water is Utah Lake, which is south and west of the Action Alternative and is within the larger evaluation area discussed in Section 3.7.2.1, Affected Environment. Utah Lake is listed as impaired for beneficial use 3B (warm-water fish) and does not meet the state standards for total phosphorous or TDS. Even though Utah Lake is outside the impact analysis area, it could receive

runoff from other streams that are crossed by the Action Alternative, such as the American Fork River and several agricultural ditches and canals.

As part of the Mountain View Corridor project, UDOT analyzed the water quality impacts to the American Fork River from a proposed seven-lane road (FHWA 2008). The same numeric analysis was used to estimate the water quality impacts to the American Fork River from the Action Alternative. This was done since the American Fork River would receive similar types of runoff from the Action Alternative as it would from the Mountain View Corridor, though the amounts and concentrations would probably be less since the majority of the Action Alternative is proposed as a smaller, five-lane road.

The American Fork River analysis, which compares modeled pollutant concentrations in stormwater runoff to the water quality standards in Utah Administrative Code Rule 317 (UAC R317), showed that there would be no impact to impaired waters or effects on beneficial uses. The modeling analysis, which assumed that runoff would pass through a detention basin before being discharged, predicts that in-stream concentrations of copper, lead, and zinc would be at or below the UAC R317 Standard of Quality for Waters of the State. Table 3.7-6 summarizes the results of the water quality modeling.

Table 3.7-6. Modeled Water Quality in the American Fork River with a Seven-Lane Road

Pollutant of Concern	Modeled In-stream 3-Year Concentration	UAC R317 Standard ^a
Copper	0.013 mg/L ^b	0.013 mg/L
Lead	0.001 mg/L ^b	0.065 mg/L
Zinc	0.047 mg/L ^b	0.120 mg/L
TDS – irrigation	581 mg/L ^c	1,200 mg/L
TDS – stock watering	581 mg/L ^c	2,000 mg/L

^a The UAC R317 standard is the maximum in-stream concentration of the pollutant that can occur over a 3-year period. Concentrations are shown in milligrams per liter (mg/L).

^b From FHWA 1996.

^c This is the concentration of TDS in highway runoff from the Stormwater Quality Data Technical Report (Salt Lake County 2000).

The numeric analysis shows that there would be no change to impaired waters or effects on beneficial uses. Though the copper concentration would match the UAC R317.2 standard, this concentration is a value that is statistically predicted to occur once every 3 years, so the copper concentration is expected to match the state standard only once every 3 years. At all other times, the copper concentration would be below the UAC R317.2 standard.

Groundwater

Groundwater Quality. The Action Alternative could affect the water quality of the shallow aquifer by increasing the pollutant load in the surface runoff, and these pollutants could infiltrate into the aquifer. However, this aquifer is already of relatively poor quality. The deeper principal aquifer, which provides much of the drinking water for the area, would not be affected by the project because the recharge area for the principal aquifer is outside the impact analysis area.

Groundwater Flow. In areas of shallow groundwater, the proposed roadway embankments could compact the underlying soils and alter the groundwater flow. During the final design phase of the project, detailed geotechnical evaluation and analysis would be required. At that time, UDOT would determine the impacts to the groundwater flows from embankment fill and the appropriate mitigation measures to minimize the impacts on groundwater-dependent resources.

Points of Diversion and Public Water Sources

The Action Alternative right-of-way would pass over 42 points of diversion. These points of diversions are listed in Table 3.7-7.

Table 3.7-7. Permitted Active Points of Diversion within the Right-of-Way

Water Source	Type of Use ^a	Number of Diversions
Underground	DIS	2
	DP	2
	D	1
	DI	1
	DOS	1
	IS	6
	I	2
	O	7
Surface	I	3
	IS	2
Return ^b	IO	1
	O	14
Total		42

Source: Utah Division of Water Rights 2008

^a Type of use: D = domestic; I = irrigation; M = municipal; O = other; S = stock watering; X = mining

^b Return: A point where non-consumptive water is returned to the natural stream.

Of the four public water sources with established source protection zones in the evaluation area, the Action Alternative would pass through Protection Zone 2 of the Geneva Steel plant well and would be about 120 feet from the well head. This well is not actively being used for public water consumption (Jensen 2008), and transportation uses are not normally prohibited within Protection Zone 2. The Action Alternative would not affect any protected public water sources.

Mitigation Measures for Impacts to Water Quality

Beneficial Uses and Impaired Waters. Planned detention or retention features will be constructed to help ensure that stormwater runoff does not affect beneficial uses. Detention or retention features will not be constructed in any existing wetland areas.

Groundwater. During the final design phase of the project, UDOT will perform detailed geotechnical evaluation and analysis and identify project-related impacts to groundwater flows. If shallow groundwater is affected by the project, flow to groundwater-dependent resources will be maintained by including features such as equalization culverts or other subsurface water-conveyance structures.

Points of Diversion and Public Water Sources. As final design progresses, UDOT will work directly with the owners and/or operators of any affected points of diversion. UDOT will strive to protect these 42 points of diversion and maintain the water supply to affected water right owners. If points of diversion cannot be protected, UDOT will ensure that wells or surface points of diversion are replaced and that the replaced wells are properly abandoned.

3.7.3 Waters of the United States

3.7.3.1 Affected Environment

Regulatory Setting

USACE Jurisdiction: Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act

Two federal statutes give USACE jurisdiction over navigable waterways and adjacent wetlands. These are Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Section 10 applies to all navigable waters of the United States. Section 404 applies to all waters, including wetlands, that have a connection to interstate commerce. A connection to interstate commerce means that the waterway or wetland is used for interstate or foreign commerce, it is used by interstate or foreign travelers for recreation or other purposes, or it supports fish populations that are or could be sold or traded across state or foreign boundaries.

Section 404, which regulates the discharge of fill material to waters of the United States, would apply to the VC project because the proposed alignment crosses Section 404 jurisdictional waters (that is, waters that are under the jurisdiction of USACE). Waters of the United States consist of essentially all surface waters including all navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters. Discharging fill material to Section 404 jurisdictional waters requires authorization from USACE. Wetlands are considered a special aquatic site under Section 404 and thus are generally the focus of Section 404 permitting.

Section 10 requires USACE to give its approval before any work is done in or over navigable waters of the United States or that affects the course, location, condition, or capacity of such waters.

USACE defines wetlands as areas where hydrophytic vegetation (plants that are adapted to wet conditions), hydric soils, and wetland hydrology are simultaneously present. USACE considers a wetland to be jurisdictional (that is, under USACE's jurisdiction) if it is characterized by these three parameters and if it is adjacent to waters of the United States.

“No Net Loss” Policy

“No net loss” has been a key policy in wetlands protection at the federal level. Beginning with President George H.W. Bush's administration, each administration has adopted the “no net loss of wetlands” policy (White House Office of Environmental Policy 1993). The original intent was acknowledged through a December 2002 joint USACE/EPA Regulatory Guidance Letter that outlined procedures to improve wetland protections through compensatory mitigation. At the same time, EPA, USACE, and the Departments of Agriculture, Commerce, Interior, and Transportation released the National Wetlands Mitigation Action Plan, a collaborative plan that listed 17 action items that federal agencies would undertake to improve the effectiveness of wetlands restoration. The primary intent of the action plan was to affirm the national policy of “no net loss” of wetlands (EPA and others 2006). USACE must consider the “no net loss” policy when reviewing requests for authorizing the discharge of fill under Section 404 of the Clean Water Act.

Waters of the United States in the Wetland Study Area

There are no Section 10 waters in the project region, so regulation under the Rivers and Harbors Act does not apply. There are, however, a number of waters subject to regulation under Section 404 in the region and in the evaluation area.

To confirm the nature and extent of potentially jurisdictional waters of the United States, UDOT sponsored a formal delineation process consistent with the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987). Through the delineation process, the team identified the types and amounts of wetlands and other waters of the United States. Initially, the wetland survey, which was completed in late 2007, focused on the VC project evaluation area so that the alternatives with the least impact to wetlands could be identified during the alternative screening process. This survey was consistent with the *Corps of Engineers Wetlands Delineation Manual*. Once a preferred alternative was identified, the delineation report using the data from the wetland survey focused on a smaller, 1,797-acre area around the alternative to provide a more concise report to USACE. UDOT submitted the delineation report in April 2008. As of November 15, 2008, USACE had not yet issued a jurisdictional determination.

The delineation process also included an assessment of functions and values of wetland features consistent with UDOT's Wetland Functional Assessment Method (UDOT 2006). When considering impacts under Section 404, USACE evaluates the functions and values of affected wetlands so that mitigation addresses not just the amount of wetland affected but also the ecological importance of each wetland. The VC functional assessment was also submitted to USACE in April 2008.

Table 3.7-8, Figure 3-9, and Figure 3-10 below summarize the results of the delineation as submitted to USACE. Detailed results are available in the *Wetland Delineation Report in Support of the Vineyard Connector Project* (HDR 2008c).

Table 3.7-8. Summary of Waters of the United States in the Wetland Study Area

Type	Total Number of Wetlands/Features ^a	Total Amount (acres)
Wetlands ^b		
Palustrine emergent	25	142.40
Palustrine scrub-shrub	2	12.26
Palustrine forested	5	4.05
Open water ^b	7	24.69
Ditch	18	4.36
	Total	187.76

Source: HDR 2008c

^a Mapped in the field as part of the wetland delineation.

^b Based on types described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin and others 1979).

Figure 3-9. Waters of the United States in the Northern Half of the Evaluation Area

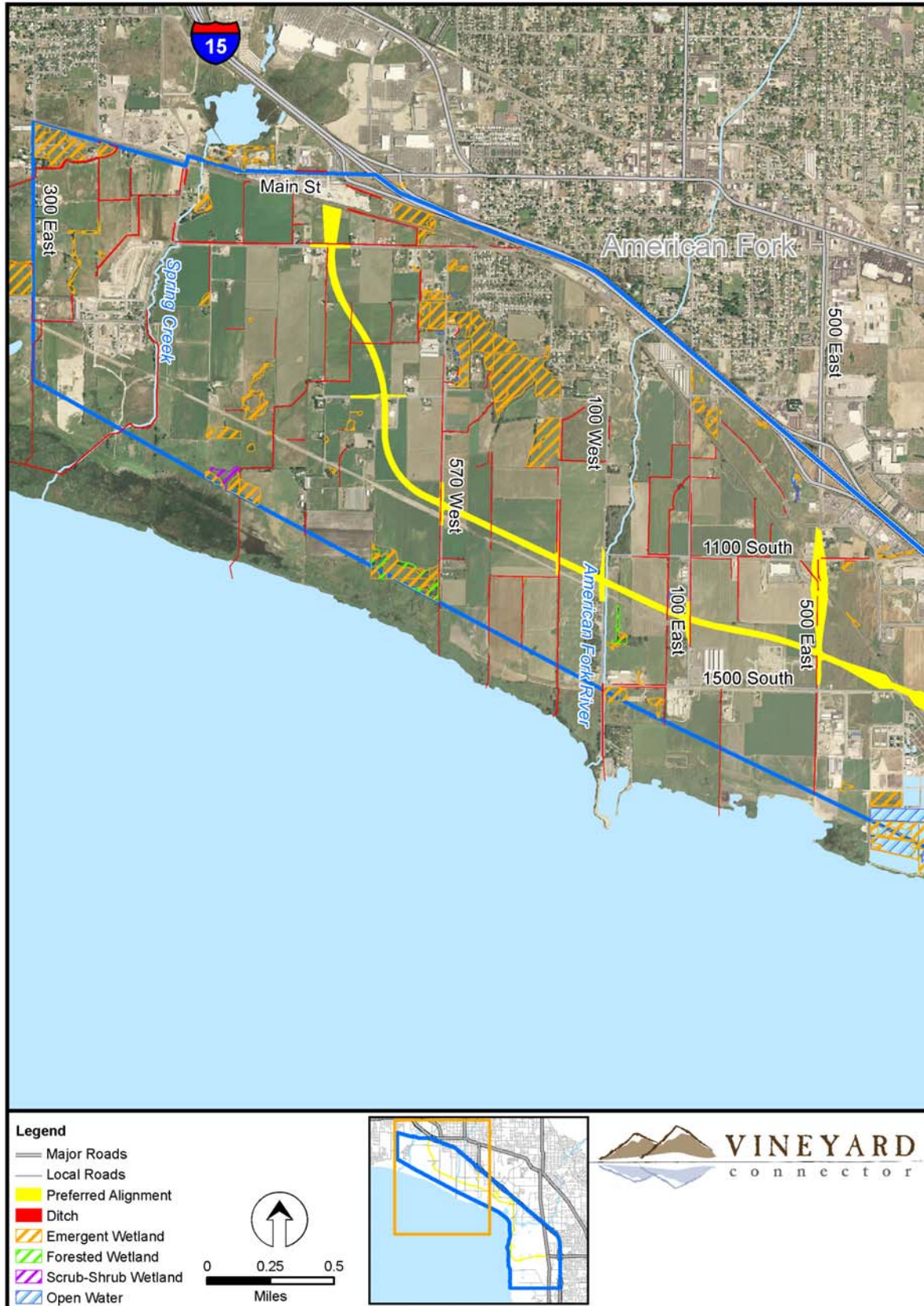
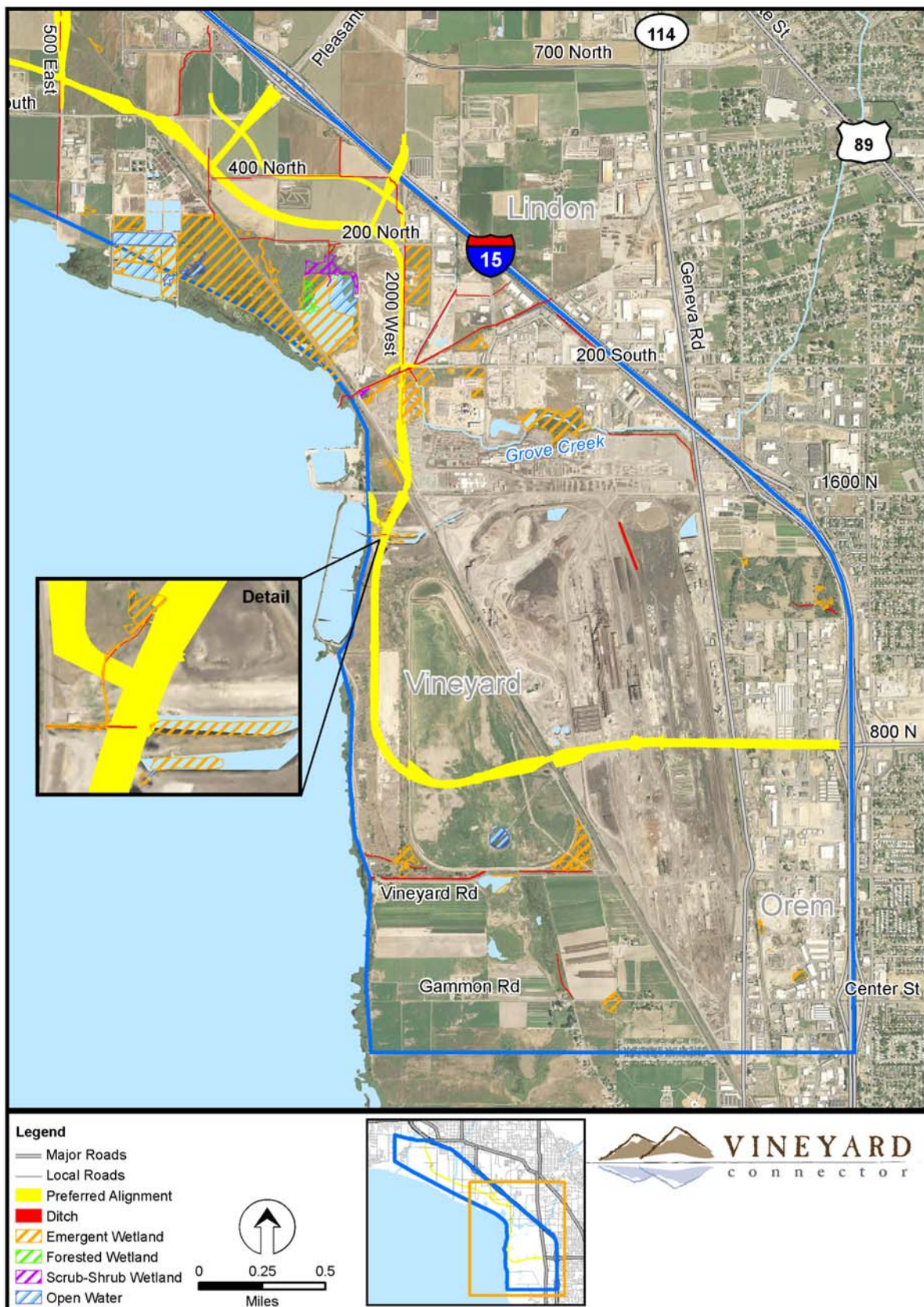


Figure 3-10. Waters of the United States in the Southern Half of the Evaluation Area



As shown in Table 3.7-8 above, the wetland study area supports five types of jurisdictional waters. Figure 3-9 and Figure 3-10 above show the wetlands in the project evaluation area, which includes the wetland study area and wetlands identified as part of previous projects in the area (HDR 2007b). Each of the wetland types is described below.

Palustrine Emergent Wetland. The most common wetland community in the wetland study area is palustrine emergent, which includes wetlands that range from inundated areas to seasonally saturated pastures. According to the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin and others 1979), emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes (plants typically found in wet habitats), excluding mosses and lichens. Vegetation is usually dominated by perennial plants and is present for most of the growing season in most years. All of the emergent wetlands in the wetland study area are considered jurisdictional because they support hydrophytic vegetation, hydric soils, and wetland hydrology and are adjacent to waters of the United States.

The palustrine emergent wetland communities in the wetland study area support sedges (*Carex* spp.), rushes, spikerush (*Eleocharis* spp.), horsetail (*Equisetum* spp.), curly dock (*Rumex crispus*), clasping pepperweed (*Lepidium perfoliatum*), seaside arrowgrass (*Triglochin maritima*), strawberry clover (*Trifolium fragiferum*), meadow foxtail (*Alopecurus pratensis*), saltgrass (*Distichlis spicata*), meadow barley (*Hordeum brachyantherum*), Mediterranean barley (*Hordeum hystris*), foxtail barley (*Hordeum jubatum*), little barley (*Hordeum pusillum*), reed canarygrass, common reed, saltmarsh alkaligrass (*Puccinellia fasciculata*), Nuttall's alkaligrass (*Puccinellia nuttalliana*), and bulrushes.

Palustrine Scrub-Shrub Wetland. Scrub-shrub wetlands are typically dominated by woody vegetation less than 20 feet tall and support true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions (Cowardin and others 1979). All mapped scrub-shrub wetland in the wetland study area are considered jurisdictional because they support hydrophytic vegetation, hydric soils, and wetland hydrology and are adjacent to waters of the United States.

The scrub-shrub wetland communities in the wetland study area support Russian olive, salt-cedar, sedges, rushes, horsetail, curly dock, cheatgrass, common dandelion (*Taraxacum officinale*), and Kentucky bluegrass (*Poa pratensis*).

Palustrine Forested Wetland. Forested wetlands are characterized by woody vegetation that is 20 feet tall or taller. All of the forested wetlands delineated in the wetland study area are considered jurisdictional because they support

hydrophytic vegetation, hydric soils, and wetland hydrology and are adjacent to waters of the United States.

Forested wetlands in the wetland study area support Fremont cottonwood, Russian olive, and salt-cedar in the overstory and a varied understory composed of thistle, cheatgrass, common dandelion, and Kentucky bluegrass.

Open Water. Open water, also called *deepwater aquatic habitat*, is comprised of areas that have a mean annual water depth greater than 6.6 feet, lack soil, and/or are unvegetated or support only floating or submersed macrophytes (plant species that can be readily observed without the aid of optical magnification) (USACE 1987). All of the open-water features in the wetland study area are considered jurisdictional because they provide a direct connection to interstate commerce.

Ditch. Ditches in the wetland study area are generally remnants of irrigation systems used throughout the area. Some ditches are still used for conveying water, while others are abandoned but still carry water all or part of the year. Some formerly natural streams have been altered so that they are now considered ditches within the study area. The American Fork River, which flows from the Wasatch Mountains to Utah Lake, and Grove Creek (also known as Hollow Ditch) are now considered ditches because of historic alteration.

USACE evaluates on a case-by-case basis whether it has jurisdiction over ditches. Ditches that appear above in Figure 3-9, Waters of the United States in the Northern Half of the Evaluation Area, and Figure 3-10, Waters of the United States in the Southern Half of the Evaluation Area, were verified as jurisdictional during the October 2008 field visit with USACE.

Functional Assessment of Delineated Wetlands

In addition to identifying the types of wetlands in the study area, the delineation report documents the functional category of each mapped wetland feature as determined through the wetland functional assessment. Wetlands were categorized as follows:

- **Category I wetlands** are those that (1) have a low level of disturbance; (2) provide habitat for federally listed or proposed threatened and endangered plant or animal species, or for a species rated S1 by the Utah Natural Heritage Program; or (3) have plant communities that are largely made up of native plant species.
- **Category II wetlands** are more common than Category I wetlands and are those that (1) provide habitat for plant or animal species rated S3 by the Utah Natural Heritage Program, (2) have a low level of disturbance or function at a high level for general wildlife habitat or general fish/aquatic habitat, or (3) have plant communities that are largely made up of native plant species.
- **Category III wetlands** are more common, generally less diverse, and often smaller and more isolated than Category I and II wetlands.

Table 3.7-9 summarizes the functional categories of delineated wetlands.

Table 3.7-9. Functional Categories of Mapped Jurisdictional Wetlands by Wetland Type

Wetland Type	Acres by Functional Category		
	Category I	Category II	Category III
Palustrine emergent	14.70	24.50	113.02
Palustrine scrub-shrub	0.00	0.00	5.99
Palustrine forested	0.00	0.00	4.76

Source: HDR 2008c

3.7.3.2 Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no impacts to wetlands and other waters of the United States would occur as a result of the project. Ongoing and future residential and commercial development from the expanding urbanization of northern Utah County would likely continue to affect wetlands and other waters of the United States in the project region.

Action Alternative

The Action Alternative would result in the discharge of fill material directly to the American Fork River (0.04 acre), 14 ditches, and 1.43 acres of emergent wetland. These impacts are summarized in Table 3.7-10 and Table 3.7-11 below and above in Figure 3-9, Waters of the United States in the Northern Half of the Evaluation Area, and Figure 3-10, Waters of the United States in the Southern Half of the Evaluation Area.

Table 3.7-10. Summary of Ditch Impacts

Ditch Number ^a	Acres of Impact
1	0.01
2	0.03
3	0.06
4	0.01
6	0.05
7	0.02
8	0.01
10	0.24
12	0.08
14	0.44
15	0.07
17	0.01
18	0.01
27	0.13
Total ditch impacts	1.17

^a As listed in the *Wetland Delineation Report in Support of the Proposed Vineyard Connector, Northern Utah County* (HDR 2008c).

Table 3.7-11. Summary of Wetland Impacts

Type ^a	Identifier ^b	Wetland Functional Category ^c	Total Size of Wetland (acres)	Acres of Impact
PEM	S	III	12.41	0.17
PEM	Y	I	7.09	1.18
PEM	CC	III	0.28	0.04
PEM	DD	III	0.88	0.02
PEM	EE	III	0.71	0.02
Total wetland impacts				1.43

^a PEM = palustrine emergent wetland.

^b All wetlands are as described in the *Wetland Delineation Report in Support of the Proposed Vineyard Connector, Northern Utah County* (HDR 2008c) and the addenda to that report.

^c Category I = wetlands that (1) have a low level of disturbance; (2) provide habitat for federally listed or proposed threatened and endangered plant or animal species, or for a species rated S1 by the Utah Natural Heritage Program; or (3) have plant communities that largely consist of native plant species.

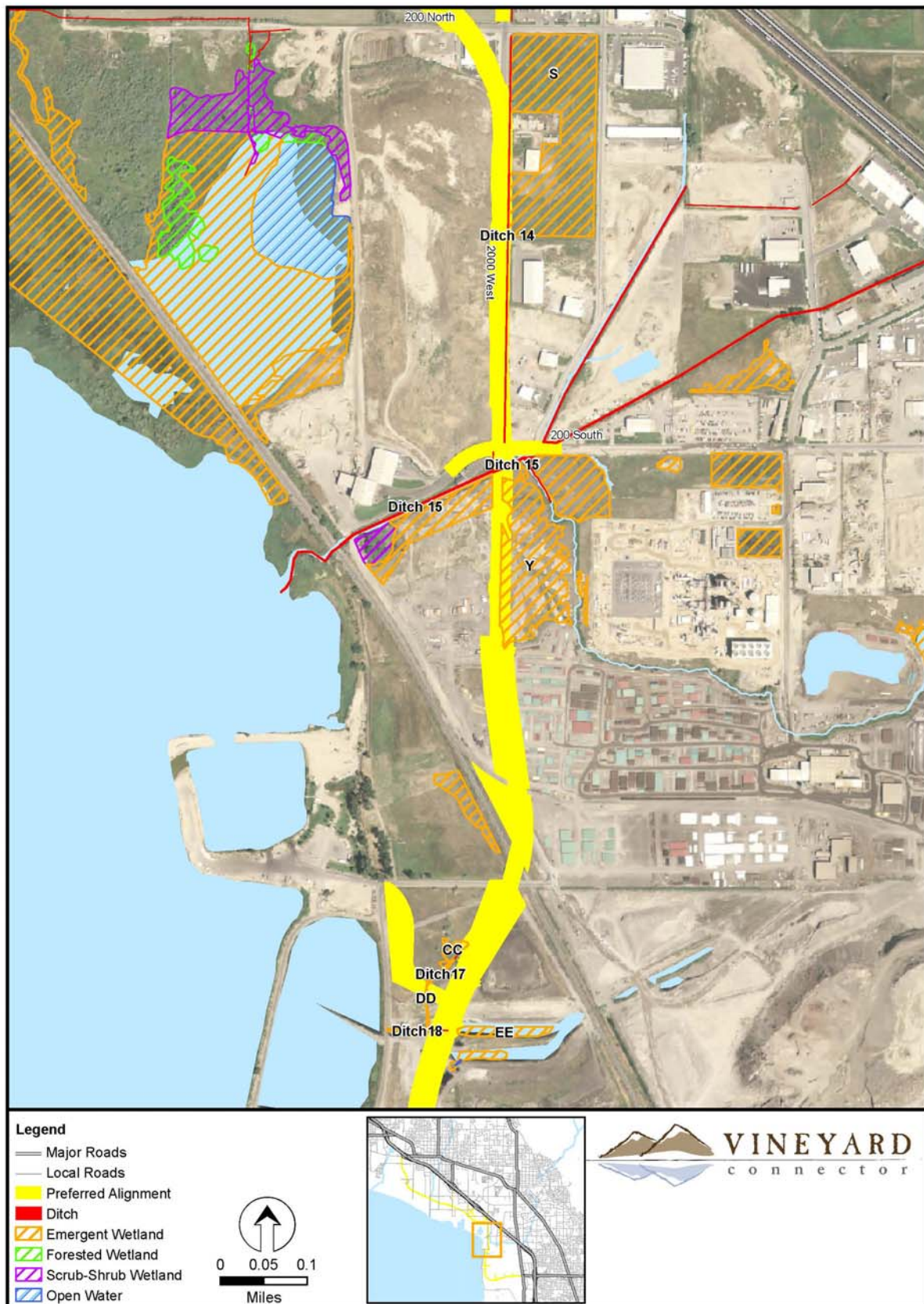
Category III = common, less diverse, small, and isolated wetlands.

Impacts to the ditches listed in Table 3.7-10 above will result in the permanent loss of 1.17 acres of non-wetland waters of the United States. Impacts to these human-made unnamed ditches would not substantially affect the function of the hydrologic system or substantially modify the larger ditch system in this part of Utah County.

The American Fork River would be crossed using a box culvert or 60-inch pipe. The 0.04 acre of impact is a conservative estimate that assumes total fill of the channel within the 120-foot right-of-way. Actual direct impacts to the American Fork River (and to jurisdictional ditches) would be minimized by converting the minimum area necessary to pipe flow under the road. Culverts for the ditches would be sized so that existing flow volumes would be maintained.

Wetland impacts have been avoided and minimized to the extent practicable by carefully considering the proposed alignment. As shown in Figure 3-11 below, wetland impacts are not complete fills of the affected features but rather fill of a portion of each feature. The remaining partial wetland areas and other nearby wetlands could be indirectly affected by hydrologic interruption. Most of the remainder of wetland S is not likely to be affected because it is upslope (east) of the Action Alternative, which means that the Action Alternative would not affect existing surface sheet flow or subsurface flow patterns. Any indirect impacts to wetland S would be minor.

Figure 3-11. Wetland Impact Details



Wetland Y is near an existing PacifiCorp wetland mitigation area west of Lindon 2000 West (the bank is just south of the North Pointe waste transfer station) and is part of an area that PacifiCorp is currently proposing for another mitigation site on the east side of 2000 West. As it moves forward with drainage design through the area of about Lindon 200 South and 400 South, UDOT will need to ensure that post-construction drainage will not affect the hydrology of either mitigation site. In doing so, UDOT will prevent indirect effects to wetlands in the area.

Wetlands CC, DD, and EE are within the former Geneva Steel plant site boundaries, and the hydrology of these wetlands has recently been affected through the ongoing RCRA cleanup. These three wetlands are very degraded; the functional assessment describes these features as having minimal wetland function, as having interrupted hydrology, and/or as being recently affected by the site cleanup. At the time this environmental study was completed, USACE had not made a determination regarding its jurisdictional authority over wetlands CC, DD, and EE. If USACE determines that the wetlands are jurisdictional, UDOT will assume responsibility for permitting any activity that is part of the VC project and that might permanently affect wetlands CC, DD, and EE. Ongoing remediation work on the Geneva Steel plant site might also affect these wetland polygons. For example, the east edge of wetland CC is formed by a very large slag pile that will be removed as part of the site cleanup; this will further affect the hydrology of this wetland. So while the VC would affect part of wetlands CC, DD, and EE, it is probable that the rest of each polygon would be permanently affected as site cleanup is completed.

Both the Clean Water Act and the federal “no net loss” policy require complete compensation for 1.43 acres of impact to emergent wetlands. Compensation levels typically reflect the function and value of affected wetlands. Compensation for impacts to the 1.18 acres of high-quality (Category I) wetland must be of the same high-quality level (that is, replacement wetlands must provide similar function and values as those that would be permanently removed).

Mitigation Measures for Impacts to Waters of the United States

Direct Impacts to Wetlands. UDOT is currently working with an interagency review team that is led by USACE to establish a wetland mitigation bank in northern Utah County. UDOT intends to use credits from this bank to mitigate impacts to wetlands subject to regulation under Section 404 of the Clean Water Act that result from projects sponsored by UDOT and that occur in the bank service area. Because the Action Alternative is in the bank service area, UDOT anticipates that mitigation credits from the bank will be used to fully compensate for permanent wetland impacts from the Action Alternative. Full compensation will ensure that the project does not result in a net loss of wetlands.

As it moves forward with project design, UDOT will ensure that postconstruction drainage through the area along the existing Lindon 2000 West near the existing and proposed PacifiCorp wetland mitigation areas is designed so that the hydrology of the wetlands in these areas is not permanently affected. Because USACE cannot legally approve the temporary or permanent fill of any wetlands on the property supporting the existing PacifiCorp wetland mitigation site west of 2000 West, UDOT and its construction contractor will avoid any direct impact to the legal parcel(s) that include(s) the site. UDOT will continue to coordinate with PacifiCorp as PacifiCorp develops its new mitigation area so that construction of the VC will minimize impacts to wetland Y and will not unnecessarily hinder or jeopardize PacifiCorp's mitigation efforts.

Direct Impacts to Other Waters of the United States. UDOT will minimize impacts to the American Fork River and unnamed ditches by converting the minimum length necessary to piped flow. If water is flowing at the time of construction, UDOT or its construction contractor will implement BMPs that ensure water quality protection during and following construction.

Indirect and Temporary Impacts to Wetlands and Other Waters of the United States. Project construction could indirectly or temporarily affect the hydrology of jurisdictional features that will not be permanently removed by the Action Alternative. UDOT will prevent and minimize these indirect and temporary impacts by using standard BMPs designed to prevent erosion and sedimentation related to dust or stormwater. UDOT will also place high-visibility fencing around areas to be preserved to prevent physical encroachment by construction equipment or personnel. The high-visibility fencing will remain in place until all construction activity in the area is complete.

3.8 Social Environment

This section addresses property acquisitions and relocations, recreation, utilities, and economics. As stated at the beginning of the chapter, this document does not address environmental justice. Information about environmental justice can be found in *Technical Report 1: Environmental Resources Not Affected by the Vineyard Connector Project* (HDR 2008e).

3.8.1 Neighborhood and Community Cohesion and Quality of Life

3.8.1.1 Affected Environment

What makes a community cohesive and adds to positive quality of life is subjective and cannot be solidly defined. For the purpose of this discussion, the VC evaluation area is made up of the established communities of Lehi, American

Fork, Lindon, Orem, and Vineyard. Residents of these areas generally identify with the cities they live in and call home.

Neighborhood and community cohesion can be described as the patterns of social networking and the degree to which residents have a sense of belonging to their neighborhood or community, including commitment to the community or a strong attachment to neighbors, institutions, or particular groups (NCHRP 2001). Cohesive “communities” can be neighborhoods, cities, or regions. Indicators of cohesion include interaction among neighbors, use of community facilities and services, community leadership, participation in local organizations, desire to stay in the community and length of residence, satisfaction with the community, and the presence of families in communities (FDOT 2003).

Utah County has many agricultural areas and has historically been thought of as a collection of very rural communities. This profile is rapidly changing as northern Utah County grows in population and associated development. The growth trends are well documented by the cities, MAG, and the State.

Lehi is a long-established residential community that borders the northwestern edge of the area. Lehi’s primary community focal point, the downtown area along Main Street, is outside the evaluation area but influences the social environment of residents of the entire city. The part of Lehi that is in the evaluation area is largely developed with lower-density residential and light-industrial uses, but residents of the evaluation area consider downtown Lehi an important element of the social environment.

Like Lehi, American Fork is a long-established community that is defined by a main street in its downtown district. Although the evaluation area does not include the downtown area of American Fork, it does include much undeveloped land that the City has identified for future growth. American Fork residents are very connected to their city and want to maintain the existing community cohesion as the community grows. However, current residents of the part of American Fork that is in the evaluation area probably relate more to rural community living than to the existing city center to the north and east.

The part of Lindon that is in the evaluation area is mostly undeveloped and is characterized by scattered farmlands and vacant land. However, Lindon City has plans to make this part of the city an important commercial node because of its location next to the Pleasant Grove Boulevard/I-15 interchange. To the east of the evaluation area, the city is well established. Most residents feel social connections to this city center and do not yet see the part of Lindon in the evaluation area as a socially important part of the city.

Orem is a well-established city that borders the evaluation area on the east. The part of Orem that is in and would be influenced by the VC currently has a

business focus, with very little residential development. Orem residents feel very connected to their city and to the industry it supports in areas such as the one that borders the evaluation area.

Vineyard is a very small rural community with a cohesiveness that has been shaped by rural living and proximity to the Geneva Steel plant site. The city has historically been defined by two primary land uses: the Geneva Steel plant on the north end of town and agricultural production on the south end of town. The owner of the former Geneva Steel plant site is currently redeveloping the area and has plans to establish a planned community with a commercial center, transit access, and residential developments of varying densities. At the same time, land to the south will probably remain rural and provide opportunities for residents to maintain a rural lifestyle. These two approaches—redevelopment and maintenance of rural living opportunities—will help define and shape the community in the future.

Quality-of-life considerations generally focus on those elements that the public associates with a positive living experience: education, safety, recreation opportunities, convenient shopping and services, access to transportation facilities, and a positive living environment. Residents of Utah generally consider their quality of life to be high. Contributing factors include a varied four-season climate, a moderate cost of living, diverse natural resources, a low rate of violent crime, high-quality education and health care, and varied cultural and recreation opportunities. Other factors, such as air quality and noise, can also affect a person's sense of quality of life.

3.8.1.2 Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no impacts to community and neighborhood cohesion or quality of life would occur as a result of the project. The social environment would continue to be affected and altered by the ongoing and planned development in the area, including the construction of new roads described in the 2007 RTP and included in the cities' transportation master plans.

Action Alternative

Residents of Utah County generally consider their quality of life to be high. Contributing factors include a varied four-season climate, a moderate cost of living, diverse natural resources, a low rate of violent crime, high-quality education and health care, and varied cultural and recreation opportunities. The project would not change any of these quality-of-life elements.

An important element of the quality of life in the northern part of the evaluation area is the rural agricultural lifestyle. However, people currently living this rural lifestyle are already experiencing change as a result of urbanization and know that such change would continue regardless of transportation improvements such as the VC. The VC would contribute to the changing nature of rural residential areas within the impact analysis area. However, because this lifestyle is already changing and would continue to do so with or without the VC, the Action Alternative is not expected to result in any new or unanticipated quality-of-life impacts.

The cohesiveness that has historically bonded the agricultural community in Utah County is expected to continue even as the region grows, since it is not based on physical layout but more on leadership and shared goals. The Action Alternative would not affect these shared goals.

3.8.2 Acquisitions and Relocations

3.8.2.1 Affected Environment

Regulatory Setting

An important part of the planning process for any transportation project includes identifying land (right-of-way) that would need to be acquired to accommodate the proposed project and understanding how placement of the new facility could directly affect people living or operating businesses along the proposed alignment. A relocation occurs when construction of a project would directly affect and require purchase of a residence or business in the direct footprint of (or sometimes very close to) the proposed transportation facility.

If displacement of residences, businesses, public facilities, or farms is required within the evaluation area, UDOT must comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 U.S.C. 4601 et seq., as amended in 1989). The act provides for uniform and equitable treatment of all people displaced from their homes, businesses, and farms without discrimination on any basis. The guidelines used by UDOT for carrying out the provisions of this act are contained in its 2007 *Relocation Assistance Brochure* (UDOT 2007). Under this program, affected residents or business owners receive relocation assistance in addition to compensation for the fair market value of the property itself.

Acquisitions and Relocations in the Evaluation Area

Whenever a new road is constructed, nearby residents and business owners are always concerned about how right-of-way acquisition might affect their

properties, homes, and/or businesses. This concern can affect the social environment. The VC evaluation area is dominated by rural residential and agricultural land uses but does support some industrial and commercial enterprises throughout.

Because most of the evaluation area is undeveloped, UDOT would probably be able to avoid substantial numbers of relocations as it acquires right-of-way. Although UDOT's approach for the VC would be to minimize relocations as much as possible, geographic and resource limitations (such as a capped landfill in Lindon and Utah Lake to the west) might result in the need to acquire properties that support existing businesses.

3.8.2.2 Environmental Consequences

The property impacts described in this section are based on preliminary engineering. The actual property impacts, which could change from these preliminary impacts, would be determined during the final design phase of the project and during the property acquisition process.

Methodology for Determining Property Impacts

In order to quantify property impacts, UDOT developed a preliminary roadway design to determine which properties would be affected by the Vineyard project. For the analysis in this study, UDOT considered three types of impacts to residences and businesses: direct impacts (relocations) that involve an impact to the property and a "take" of a residence or commercial building, land-only impacts that involve a total take of a property but no structures, and strip takes/construction easements that involve acquisition of part of a property. Because strip takes and construction easements do not normally result in permanent impacts to existing homes and businesses, the primary impacts that are analyzed are direct impacts (relocations) and land-only impacts (total property takes).

Direct Impacts (Relocations). For the purpose of this analysis, a direct impact to a residence or business occurs when an existing structure is within the right-of-way of the proposed improvements. These structures include not only the primary home or business structure but also garages, sheds, and other buildings that are not attached to the main building. This type of impact is referred to as a *relocation* because the entire property would need to be acquired and the residents or business would need to relocate. Note, however, that the original structure itself would not be relocated.

Land-Only Impacts (Total Property Takes). For the purpose of this analysis, a land-only impact occurs when the right-of-way needed for the project affects such a large portion of the property that the remainder would be unusable. In this

case, UDOT would acquire the entire property. Land-only impacts do not involve the acquisition of structures.

Strip Takes/Construction Easements. For the purpose of this analysis, a strip take impact occurs when a property is located within the proposed right-of-way but the right-of-way is more than 15 feet from an existing structure. This type of impact is referred to as a *strip take* because only a strip of land would need to be acquired. Strip takes are not considered relocations and are not included in the table for this section.

Some properties outside the right-of-way might be affected by cuts or fills required during roadway construction. UDOT would temporarily acquire these properties with construction easements. Although these properties might be temporarily affected, construction easements are not considered relocations and are not included in the table for this section. UDOT would compensate the property owners for the temporary use of the property, and the restored property would be returned to the owner when the use of the property is no longer needed.

No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no right-of-way would need to be acquired for the project, and no residents or businesses would be subject to relocation as a result of the project.

Action Alternative

The Action Alternative would require the acquisition of two residential properties and four businesses (County Animal Shelter plus three commercial businesses). In addition, the project would require a total take of 11 properties (land-only) that are undeveloped or are used for agriculture. These estimates are preliminary and could be updated during the final design phase of the project and the acquisition process. The properties are identified in Table 3.8-1 below.

Based on preliminary engineering, the VC would also require 92 strip takes/construction easements. These impacts could be permanent property impacts, perpetual easements, or temporary easements.

As UDOT moves into final planning for the VC, it would work directly with affected landowners to determine the precise impacts to each property, including impacts related to access.

Table 3.8-1. Potential Property Impacts from the Vineyard Connector

Property	Parcel ID Number	Address ^a
<i>Direct Impacts (Relocations) – Property Impacts with Structures</i>		
Residential	17:031:0090	1545 West 800 North, Orem
County Animal Shelter	47:245:0001	193 North 2000 West, London
Commercial – SJSC LLC	66:135:0001	2995 West 600 North, London
Residential/agricultural	13:067:0010	6625 North 5750 West, American Fork
Residential/agricultural	13:043:0015	6695 West 7300 North, American Fork
Commercial – Knight Allen Distributor LLC	13:061:0011	491 East 1200 South, American Fork
Commercial – R&D LLC	13:061:0026	1045 South 500 East, American Fork
<i>Land-Only Impacts – Total Property Take</i>		
Agricultural	13:063:0058	American Fork
Agricultural	13:060:0034	Utah County
Agricultural	13:060:0005	Utah County
Agricultural (undeveloped) ^b	13:060:0007	Utah County
Agricultural (undeveloped) ^b	13:060:0008	Utah County
Agricultural (undeveloped) ^b	13:064:0006	Utah County
Agricultural	13:043:0022	7501 North 6800 West, American Fork
Agricultural	13:041:0054	American Fork
Agricultural	13:041:0055	American Fork
Agricultural	13:041:0027	7800 North 6800 West, American Fork
Agricultural	13:041:0013	American Fork

These potential impacts are preliminary and are subject to final design.

^a If an agricultural property does not have a street address and is not within city limits, only the city or county of the property is given.

^b The property is listed as agricultural in county tax records but is currently undeveloped land.

Mitigation Measures for Property Impacts

If land (complete parcels or strip takes), residences, or farms need to be acquired to obtain right-of-way for the VC, UDOT must comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 U.S.C. 4601 et seq., as amended in 1989). The act provides for uniform and equitable treatment of all people displaced from their homes, businesses, and farms without discrimination on any basis. The guidelines used by UDOT for carrying out the provisions of this act are contained in its 2007 Relocation Assistance Brochure (UDOT 2007).

UDOT will work with landowners whose access is affected by construction of the VC to either maintain existing access(es) or provide new access(es). If access

cannot be maintained or relocated, UDOT will work with the affected landowners consistent with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

3.8.3 Recreation

3.8.3.1 Affected Environment

Recreation activities refresh, enliven, and entertain people and enhance their quality of life. Recreational resources in the evaluation area are very limited and are dominated by dispersed activities such as hiking and bicycling.

Table 3.8-2 lists the existing and planned recreational facilities in the evaluation area.

Table 3.8-2. Recreational Facilities in the Evaluation Area

Type	Name	Activities	Location
Park	J. Rulon Gammon Park	Playground equipment, play fields, and pavilions	240 E. Gammon Road, Vineyard
Park	Mountain Meadows Park (under development)	Dispersed recreation	400 South 500 West, American Fork
Park	Geneva Resort Park (planned)	Unidentified	200 South 2000 West, Lindon
Park	Spring Creek Ranch (under development)	Playground, basketball court, tennis court	1760 S. Weeping Willow Way, Lehi
Park	Vineyard Park	Playground	240 E. Gammon Road, Vineyard
Trail	Spring Creek Trail (partially constructed)	Hiking and bicycling	Along Spring Creek from Mill Pond to the Lakeshore Trail
Trail	Powerline Trail (planned)	Hiking, bicycling, equestrian use	Lakeshore Trail to 1000 South in Lehi (would pass through American Fork)
Trail	Lakeshore Trail (partially constructed)	Hiking and bicycling	Jordan River Parkway Trail in Saratoga Springs to the Provo River Trail in Provo (would pass through Lindon and Vineyard)
Trail	Lindon Heritage Trail (planned)	Hiking and bicycling	Once completed, would connect Lindon City Center Park to the Lindon Boat Harbor
Trail	Unnamed local trail (planned)	Hiking and bicycling	Geneva Resort Park in Lindon to the commercial area near the I-15/Pleasant Grove Boulevard interchange
Trail	Pleasant Grove Boulevard Trail (planned)	Hiking and bicycling	I-15 to State Street in Pleasant Grove
Trail	Gammon Trail (planned)	Hiking and bicycling	Orem Lake Shore Park to the Lakeshore Trail (will pass through Vineyard)

The Lindon Boat Harbor, which is just west of the evaluation area on the shore of Utah Lake, is accessed by a road that passes through the evaluation area. This privately owned facility provides an important lake access to area residents during the boating season.

3.8.3.2 Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, recreation facilities would continue to be managed according to the recreation plans and policies for each of the jurisdictions.

Action Alternative

The planned Geneva Resort Park site is adjacent to the west side of the Action Alternative at about 1600 North in Lindon. UDOT would provide access from the new road to both the park and the adjacent privately operated Lindon Boat Harbor west of 2000 West. The Action Alternative would not affect the park or the boat harbor.

Since the Lindon Heritage Trail is not yet constructed, UDOT has been working with Lindon City to incorporate into the project those sections of the trail that cross or parallel the VC and provide access to the boat harbor. Depending on the jurisdiction through which the trails pass, the road will have a 12-foot-wide asphalt trail.

The existing Lakeshore Trail segment south of the Lindon Boat Harbor would remain open for use during construction. UDOT will ensure that access to the trailhead, which is near the Lindon Boat Harbor, is maintained during and after construction. No other recreational resources would be affected by the VC project.

Mitigation Measures for Recreation Impacts

UDOT will ensure that access to the Lindon Boat Harbor and the Lakeshore Trail is maintained during construction. UDOT or its construction contractor will place signs in advance of construction to warn users of upcoming construction activities. The signs will include information about anticipated construction dates and alternate routes and will provide a phone number for users to call for more information. If there are times when access might be limited or temporarily closed, UDOT or its contractor will coordinate with the appropriate land manager.

3.8.4 Utilities

3.8.4.1 Affected Environment

The availability of utility services directly affects the social environment. Any physical impacts to utilities or impacts to utility service could affect the quality of life of residents in the evaluation area.

Utilities in the evaluation area include those typical of developed areas: electrical transmission facilities, natural-gas facilities, cable television lines, irrigation lines, sanitary sewer lines, water lines, and telephone lines. A major utility corridor parallels the Utah Lake shore in the northern half of the evaluation area; the main corridor stops south and east of about 500 East and smaller (narrower) corridors continue south and southeast. Any work around this corridor would require extensive coordination with utility service providers.

In addition to electric transmission facilities, PacifiCorp (doing business as Rocky Mountain Power) owns and operates a large electric generation facility, called the Lake Side Power Plant, in Lindon just west of I-15 and just east of the Action Alternative alignment. PacifiCorp owns much of the land surrounding the plant and will probably complete an expansion in the next 15 to 20 years.

In some cases, work near or through utility lines can occur only during a very short period of time. As an example, work that would require interruption of the high-voltage electrical transmission and/or high-pressure natural-gas facilities would be limited to a 1- to 2-week period in October of any given year.

3.8.4.2 Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, the normal and necessary utility maintenance needed to supply service to utility customers would continue. Regional growth could also require the construction of new facilities needed to serve planned development.

Action Alternative

The Action Alternative would directly affect electrical transmission facilities, natural-gas facilities, cable television lines, irrigation lines, sanitary sewer lines, water lines, and telephone lines (see Table 3.8-3).

Table 3.8-3. Potential Utility Impacts

Utility Type	Impacts
8-inch water main	345 feet
Valves	9 valves
Fire hydrants	23 hydrants
Cable TV	746 feet
12-inch water main	6,444 feet
Water (other)	7,073 feet
Ditches	7,024 feet
Telephone	20,933 feet
Sanitary sewer	18,683 feet
Gas	12,248 feet
Fiber optic	4,062 feet
Electrical	27,593 feet
Pipes (other)	5,398 feet

Source: CRS 2008

As shown in Table 3.8-3 above, the Action Alternative would cross or result in direct effects to several different types of utilities. In some areas, impacts would be the result of the road crossing a single transmission line. In other areas, the road's proximity to a complex arrangement of utilities would require careful planning and construction. One area that would be particularly challenging is near where the Action Alternative crosses 1500 South in American Fork. The area surrounding the existing PacifiCorp power plant would also pose a challenge based on the extensive network of electrical transmission lines coming from the plant. Near the PacifiCorp power plant, the VC would cross under a high-voltage electrical transmission line that could be taken out of service only during the very short October outage window.

Because final design is not complete, only the location of impacts can be identified. The precise extent of impacts to utilities would be identified during the final design phase of the project. UDOT and its contractors would continue to coordinate with the utility providers as project planning progresses.

Mitigation Measures for Utility Impacts

Prior to construction, UDOT or its contractor will coordinate with Blue Stakes of Utah Utility Notification Center, Inc. (Blue Stakes) to ensure compliance with the Damage to Underground Utility Facilities Act (Utah Administrative Code 54-8a-2 through 54-8a-11). Blue Stakes will be notified at least 2 business days before the start of construction-related excavation but not more than 7 calendar days before construction-related excavation. Notices of excavation to Blue Stakes are valid for 14 calendar days. If excavation lasts more than 14 calendar days, the contractor will give notice for each succeeding 14-calendar-day period.

To ensure that inconveniences to customers are minimized, UDOT will work closely with utility service providers to ensure that service interruptions are minimized. Once interruption or outage schedules are developed, UDOT or its construction contractor will notify all affected utility customers of planned outages or interruptions in service at least 7 calendar days before the scheduled outage or interruption. Customers will be notified by direct mailings, by placing notices on affected properties, or by both mailings and notices. All mailings and notices will provide contact information for a person who can answer questions about the outage or interruption.

3.8.5 Economics

This section examines the economic characteristics of the VC evaluation area, which includes Utah County and portions of Lehi, American Fork, Lindon, Vineyard, and Orem. This section also includes some information on the regional economy, since local economies are affected by regional as well as local conditions. Data on commercial and industrial activity, employment, wages, and income are included to provide an overview of existing economic conditions in the evaluation area and in the region. Data on property and sales tax revenues are included to indicate the level of county and municipal government operations in the evaluation area.

3.8.5.1 Affected Environment

Employment, Wages, and Income

Table 3.8-4 below provides data on nonagricultural employment in Utah County and the state of Utah. Utah County is the state's second-most-populated county.

Overall, employment growth in Utah County increased by 36.6% between 1995 and 2005. During this same period, nonagricultural employment in Utah increased by 26.5%.

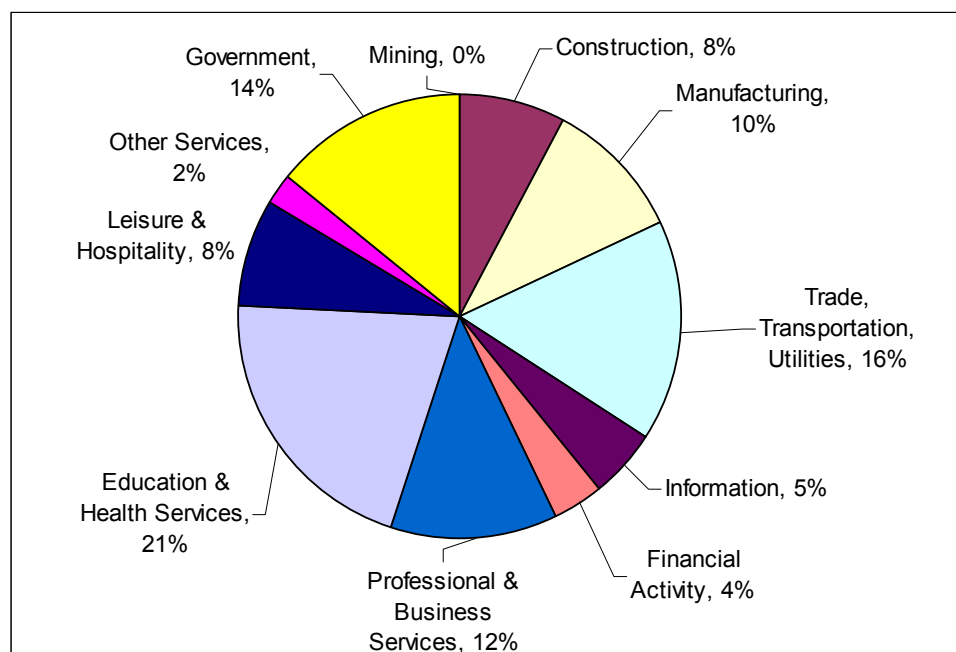
Table 3.8-4. Nonagricultural Employment in Utah and Utah County

Area	Nonagricultural Employment			Percent Change	
	1995	2000	2005	1995–2000	1995–2005
Utah	907,886	1,074,879	1,148,320	18.4%	26.5%
Utah County	122,943	152,699	167,938	19.5%	36.6%

Source: Utah Department of Workforce Services 2005

Figure 3-12 shows the distribution of Utah County jobs by sector in 2005. The service and government sectors provide the majority of jobs in the county. These sectors include education and health services; trade, transportation, and utilities; professional and business services; and government jobs, which together account for about 60% of the employment in Utah County. Manufacturing, construction, and mining provide less than 20% of the county's nonagricultural employment.

Figure 3-12. Utah County Nonagricultural Job Distribution by Sector, 2005



Source: Utah Department of Workforce Services 2006

According to the Utah Department of Workforce Services, the services sectors (education and health services, government, leisure and hospitality, information,

professional and business services, and other services) include most of the 24 largest employers in Utah County in 2007 (Utah Department of Workforce Services 2007). Five of the top employers are from the education sector and employ between 25,000 and 35,000 people in Utah County. The largest single employer, Brigham Young University, employs between 15,000 and 20,000 people.

Utah County's employment base is primarily distributed in the more populated areas of Provo and Orem. Of these two cities, only a small part of Orem is in the evaluation area, and this part is far from the Orem city center. Most residents in the evaluation area commute to jobs in the Salt Lake Valley and the Provo-Orem area (MAG 2006).

Projected employment growth in Utah County is shown in Table 3.8-5. The overall employment growth between 2006 and 2012 is anticipated to be similar to recent trends. Total employment is expected to grow by about 21.6%. The services sectors are expected to be the main driver for growth. Construction will grow at a similar rate and will keep pace with the growing economy. Natural resources and mining is expected to decline by about 5%.

Table 3.8-5. Employment Projections by Sector in Utah County, 2001–2012

Sector	2001	2006	2012	Percent Change 2006–2012
Natural Resources and Mining	3,642	3,858	3,649	–5.4%
Construction	15,254	18,545	23,517	26.8%
Manufacturing	20,785	21,867	24,093	10.2%
Trade, Transportation, Utilities	31,466	37,557	43,336	15.4%
Information	8,236	8,875	11,054	24.6%
Financial Activity	15,358	18,954	22,499	18.7%
Professional and Business Services	26,069	33,278	42,532	27.8%
Education and Health Services	31,609	38,806	49,629	27.9%
Leisure and Hospitality	14,710	18,184	22,567	24.1%
Other Services	10,656	14,126	17,284	22.4%
Government	23,392	27,832	33,956	22.0%
Total	201,177	241,882	294,116	21.6%

Source: Utah Governor's Office of Planning and Budget 2007

Table 3.8-6 lists average monthly wages for nonagricultural employment sectors in Utah, Utah County, and the communities in the evaluation area in 2005. For all but the information sector, average wages in Utah County are less than the state average. The information sector, which provides 5% of employment, has wages that are 20% higher than the state average. Of the communities, American Fork had the highest wages in one employment sector, Orem had the highest wages for six of the employment sectors, and Lindon had the highest wages for five of the employment sectors.

Table 3.8-6. Average Monthly Nonagricultural Wages in Utah, Utah County, and Evaluation Area Communities by Sector in 2005

Sector	Wages by Geographic Area					
	Utah	Utah County	American Fork	Orem	Lindon	Vineyard
Total average monthly wages	\$2,736	\$2,423	\$1,647	\$2,443	\$2,464	NA^a
Natural Resources and Mining	\$4,778	\$3,236	\$0	\$2,923	\$0	NA
Construction	\$2,695	\$2,426	\$1,994	\$2,121	\$2,402	NA
Manufacturing	\$3,312	\$3,019	— ^b	\$2,853	\$2,910	NA
Trade, Transportation, Utilities	\$2,608	\$2,177	\$2,102	\$2,586	\$2,458	NA
Information	\$3,752	\$4,492	\$0	\$3,116	\$2,734	NA
Financial Activity	\$3,574	\$2,920	— ^b	\$2,767	\$2,264	NA
Professional and Business Services	\$3,107	\$2,650	\$2,187	\$2,155	\$2,116	NA
Education and Health Services	\$2,530	\$2,269	\$1,367	\$2,667	\$1,501	NA
Leisure and Hospitality	\$1,117	\$918	— ^b	\$1,004	\$948	NA
Other Services	\$2,018	\$1,726	— ^b	\$1,839	\$1,980	NA
Government	\$2,847	\$2,375	\$2,067	\$2,637	\$2,768	NA

Source: Utah Department of Workforce Services 2005

^a NA = data not available.

^b Not shown to avoid disclosure of individual firm data and not included in the total.

Personal income trends in Utah County are shown in Table 3.8-7 below. Utah County personal income is about 16% of the total state personal income. Personal income growth in the county between 2000 and 2005 was less than the state average but kept pace with employment growth during the same period. Utah County per-capita income is about 25% less than total the state average. Per-capita income growth has been less than total personal income, but the 28.5% growth in total personal income in the county indicates that the regional economy is rapidly developing.

Table 3.8-7. Income Trends in Utah County

Utah County Income	Income		Percent Change
	2000	2005 ^a	
Total personal income (millions)	\$7,283,943	\$9,365,270	28.5%
Per-capita personal income	\$19,637	\$20,726	5.5%

Source: U.S. Bureau of Economic Analysis 2007

^a For comparison purposes, the 2005 state personal income was \$58,171,500. The 2005 state average per-capita income was \$28,089.

Overall, employment and income in Utah County have increased over the past decade. The services sectors continue to dominate employment and are also projected to experience increases through 2012. However, the majority of the residents in the evaluation area commute outside of their communities for work in the Salt Lake Valley and the Provo-Orem area.

Property and Sales Tax Revenues

Property and sales tax revenues are a measure of government and public agency activity in the evaluation area. Property taxes are collected on the assessed value of the land and structures. Typically, agricultural land has a lower property value than residential, commercial, and industrial land. Sales taxes are collected on sales of “final” goods and services. Sales taxes are generated from both the commercial and industrial sectors.

Property and sales tax revenues are shown in Table 3.8-8 below for the jurisdictions in the evaluation area. Of the jurisdictions, Vineyard had the smallest combined municipal property and sales tax revenue (\$169,107). Orem had the highest combined municipal property and sales tax revenue (\$34,718,440) among the four communities, which indicates a larger budget and a higher level of services. It is important to note that only a very small portion of Orem is included in the evaluation area.

Table 3.8-8. Tax Revenues by Jurisdiction in 2006

Jurisdiction	Property Tax Revenue	Sales Tax Revenue	Other Taxes ^a
Utah County	\$30,781,535	NA	\$23,229,976
American Fork	\$3,252,007	NA	\$6,585,612
Orem	\$8,741,450	\$18,008,143	\$7,968,847
Lindon	\$984,008	\$256,077	\$52,146
Vineyard	\$117,940	\$43,808	\$7,269

Source: Utah State Auditor's Office 2007

^a Includes taxes related to temporary lodging (for example, hotel and motel taxes), tourism, telecommunications, and energy.

Within the evaluation area, the land in American Fork, Lindon, and Vineyard is primarily agricultural with some low- and medium-density residential and small businesses scattered throughout. Light-industrial land uses are located near I-15 in Orem. Overall, most of the evaluation area is composed of lower-assessed property (zoned agricultural) with some higher-valued areas of commercial, industrial, and residential land uses. However, the cities of Lindon and American Fork have recently planned new commercial developments around the I-15 interchange in Pleasant Grove. The development potential in this area is constrained by the existing rail line that bisects this area, a landfill, and Utah Lake. The cities are planning these developments using the existing local road network.

Vineyard contains the site of the former Geneva Steel plant, which was one of the largest employers in Utah County until the 1990s, when the plant closed. The steel plant, which was located on 1,700 acres, has been removed and the land is being cleaned up so that the site can be redeveloped. As proposed, the site would become a large residential and commercial area on the west side of I-15.

3.8.5.2 Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so no relocation of businesses or loss of sales tax revenues would occur as a result of the project.

Under the No-Action Alternative, the regional economy would continue to grow along with population and employment.

Action Alternative

The discussion of economic consequences provides decision-makers with information about how a project might affect the economies of the surrounding

communities. The main issues of concern for the VC project are developable land; employment, wages, and income; and property and sales tax revenues.

Economic issues were addressed by reviewing published data that describe the strength of the local economy, including population growth, job creation and unemployment, and availability and affordability of housing.

The evaluation area has a low level of economic activity; however, major new residential, commercial, and mixed-use developments are planned by the Town of Vineyard, Lindon City, and American Fork City. The greatest impact, according to the cities of American Fork and Lindon, is that the VC might reduce development potential in the part of their cities that is between I-15 and Utah Lake by bisecting developable land.

Employment, Wages, and Income

Overall, employment and income in Utah County have increased over the past decade, and growth in employment between 2006 and 2012 is anticipated to be similar to recent trends. Total employment is expected to grow by about 20%. The services sectors are expected to be the main driver for growth and construction and are expected to grow at a similar rate, keeping pace with the growing economy. However, if the Action Alternative is built, construction employment would increase in the short term during construction. This increase in jobs in the construction industry would be a temporary and beneficial impact to the local economies in the evaluation area. Most construction jobs in Utah County would go to workers who live in the area. Construction jobs would generate additional employment when construction workers purchase goods and services in the community and their pay circulates through the local economy.

Many of the cities in the evaluation area are concerned that the proposed project could limit development potential, thus reducing potential employment and wage opportunities. Currently, Lindon City and American Fork City have identified areas where they intend to allow new commercial and industrial development in the evaluation area. UDOT developed the Action Alternative to minimize impacts to these areas and to expected new developments, so this alternative should have minor impacts to the amount of developable land taken for road use. Therefore, UDOT does not expect that the project would reduce the opportunities for increased employment in the evaluation area. The project would provide some benefits with improved access to these new commercial and industrial development areas.

The project would provide improved economic opportunity for the former Geneva Steel plant site. This site was once a prosperous steel plant from the early 1900s to about 1990. The steel plant was removed, and the site has been

proposed for redevelopment to reintroduce commercial uses along with residential development. With a proposed mixed-use development and transit station at the Geneva Steel plant site, the Action Alternative would provide regional connectivity, which would bring in more people from the surrounding area to this development. Without a regional connection to the Geneva Steel plant site, the use of the commuter-rail station, transit-oriented development, and mixed-use developments could be limited, which would reduce the economic opportunities (employment) at this redevelopment site.

Another benefit of the Geneva redevelopment could be reduced travel. Most of Utah County's employment base is distributed in the more populated areas of Provo and Orem. Since most residents of the evaluation area commute to jobs in the Provo-Orem area and the Salt Lake Valley (MAG 2006), commute times could be reduced by the proposed new, more direct route to I-15, which serves as the major north-south access to these employment areas. The Action Alternative would also provide direct access to the commuter-rail station, which would accommodate residents' use of the commuter-rail line.

The VC would affect four existing businesses (County Animal Shelter, Knight Allen Distributor, R&D LLC, and SJSC LLC) along the alignment. The acquisition of right-of-way would require these businesses to be relocated, and proximity impacts would cause some loss of property from other businesses. All property acquisitions resulting from the project would comply with the Uniform Relocation Assistance Act, as amended; Title VI of the Civil Rights Act of 1964; and 49 CFR 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs. The VC project would require the relocation of nine businesses (see Section 3.8.2, Acquisitions and Relocations). These relocations could result in the loss of employment; however, these businesses could likely be relocated in the area given the availability of commercial and vacant property.

Property and Sales Tax Revenues

Most of the land in the evaluation area is lower-assessed property (zoned agricultural) with some higher-valued areas of residential, commercial, and industrial land uses. The cities in the area developed economic development plans before the VC was proposed in the 2007 Regional Transportation Plan (MAG 2007). The cities of Lindon and American Fork are concerned that the project could reduce the amount of developable commercial and industrial land by bisecting large tracts of land, creating remnants that would not be large enough to support planned commercial and industrial uses. This concern is exacerbated by constraints caused by the existing rail line, Utah Lake, I-15, and a landfill. If the project is not designed properly, this could reduce the potential

property tax revenues as the land is converted from agricultural to commercial or residential uses as desired by the cities. To address this issue, UDOT worked closely with the cities to identify a route that would minimize impacts to developable land. The Action Alternative would reduce some of the land available for development, but the impact should be minor.

Because the cities believe that the project could reduce some development opportunities and because the cities planned for commercial and industrial development in the area before the project was proposed, UDOT does not expect that the VC would induce economic development beyond what is currently planned.

In summary, the economic impacts of the Action Alternative are expected to be minor. Beneficial impacts could include improvements to employment, wages, and income, while adverse impacts would probably be a result of disruptions during construction and changes to the layout of expected commercial and industrial development in Lindon and American Fork.

Mitigation Measures for Economic Impacts

UDOT will provide signage to assure potential customers that businesses in or near the construction area are open and will ensure that access is maintained to all property during construction. As noted in Section 3.8.2, Acquisitions and Relocations, all relocations will be done in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, which mandates the uniform and equitable treatment of property owners and renters of homes, businesses, or farms that are acquired by federal and federally assisted programs.

3.9 Cultural Resources

This section summarizes cultural resources in the study area, which is generally the same as the evaluation area. The area of potential effects for the cultural resources study is described in Section 3.9.1.2, Resource Identification.

3.9.1 Affected Environment

3.9.1.1 Regulatory Setting

Utah Code Annotated Section 9-8-404 states that UDOT must take into account the effect of its projects on any historic property. Utah Code Annotated Section 9-8-302 defines a historic property as any prehistoric or historic district, site, building, structure, or specimen included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) or the State Register. Under state

law, UDOT must also provide the State Historic Preservation Officer with a written evaluation of the project's effect on the historic property unless exempted by an agreement. Because the VC cannot be processed by UDOT as a Tier 1 project under its existing Programmatic Agreement with the State Historic Preservation Officer, UDOT is required to complete consultation under Section 9-8-404.

Utah's law references the National Historic Preservation Act (NHPA). The NHPA, which predates Utah's law, was enacted to assess impacts to historical and archaeological resources that could result from undertakings involving federal agencies. Paleontological resources are also given consideration under this act. The act requires federal agencies that fund, permit, or are otherwise involved in a project (for example, as a landowner) to consider the impacts that the undertaking would have on cultural resources. The act also created the NRHP.

The NHPA mandates that agencies perform the following actions:

- Make an effort to identify historic properties that could be affected by a project, including historic and archaeological sites that are either listed on the NRHP or have been determined through a consensus process to be eligible for listing on the NRHP.
- Assess the nature and extent of the expected impacts on the qualities of the resource that resulted in its listing on the NRHP or the determination that it was eligible for listing on the NRHP.
- Consider measures to avoid, minimize, or mitigate those impacts.

The results needed to support a state-level consultation would also support a federal consultation under NHPA. UDOT anticipates that USACE would need to complete consultation under federal law and that USACE would use the same information about properties that are eligible for listing on the NRHP or on the State Register. The process through which the actions described above are carried out is outlined in 36 CFR 800, commonly referred to as the Section 106 regulations. This process includes steps for consulting with state and/or tribal historic preservation officers, the Advisory Council on Historic Preservation, Native American tribes, and other interested parties.

Request for Information from Tribal Governments

Federal legislation such as the NHPA and Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, mandates that federal agencies involved in a project that could affect resources of importance to Native American tribes must consult with those federally recognized tribes when the location of the federal undertaking is within an area of traditional use for the

tribe. This consultation occurs at a government-to-government level in recognition of the sovereign status of the tribes. Because UDOT is not a federal agency, it did not initiate formal tribal consultation under Executive Order 13175. UDOT did, however, seek project input from local and regional tribal representatives as part of the environmental study process. The State's request for information would support formal consultation that would be initiated by USACE in support of a Clean Water Act permit for the project. UDOT worked directly with USACE to identify tribal contacts.

The goal of UDOT's request for information was to identify resources of importance to the affected tribes, to assess the nature and extent of the impact on the characteristics of the resources that make them important, and to work through a collaborative process to identify acceptable measures for avoiding, minimizing, or mitigating impacts to the resources. UDOT contacted and requested information from the following federally recognized tribes: Skull Valley Band of Goshute Indians, Northwestern Band of Shoshone Nation, Shoshone-Bannock Tribes, and the Ute Indian Tribe. UDOT also contacted the Eastern Nevada Agency Bureau of Indian Affairs (BIA), the Uintah and Ouray Agency BIA, and the Utah Division of Indian Affairs. Mr. Kenneth Timbana of the Northwestern Band of the Shoshone Nation was the only tribal representative that responded to UDOT's request for information. Mr. Timbana's letter can be found in Appendix C, Native American Consultation Letters.

Paleontological Resource Considerations

The State of Utah has enacted legislation (Utah Code Annotated Section 63-73-19) that requires avoidance or minimization of impacts to paleontological resources on projects with state involvement. As part of this state-level legislation, UDOT entered into a Memorandum of Understanding with the Utah Geological Survey (UGS) for the purpose of consultation to identify known or potential paleontological localities of importance that could be affected by UDOT's projects and to consider measures to avoid or minimize those impacts.

The third-party consultant for the VC project contacted UGS on behalf of UDOT and requested information about any known or potential paleontological resources in the cultural resources study area. The outcome of this consultation is described in Section 3.9.2.3, Action Alternative.

Agencies, Tribes, and Their Roles

The Utah Division of State History is the state agency responsible for the oversight of cultural resource management in Utah. The Division of State History includes the Utah State Historic Preservation Office, which houses the State Historic Preservation Officer and the State Archaeologist, as well as architectural

historians, preservation planners, managers of archaeological and historic site records, and cultural resource and preservation specialists. Under the Section 106 regulations, the Utah State Historic Preservation Officer is a consulting party on all projects that require compliance with federal preservation laws. The Utah State Historic Preservation Officer also serves as a consulting party for projects that must comply solely with state preservation laws.

Because UDOT anticipates that it will need to obtain a permit to place fill material in waters of the United States under Section 404 of the federal Clean Water Act, the need to comply with Section 106 of the National Historic Preservation Act is assumed. USACE will be responsible for formal Section 106 consultation as part of the Clean Water Act permit process, will take into account the effects of permit issuance on historic properties, and will consult with Native American tribes with patrimonial claims to the project area.

3.9.1.2 Resource Identification

UDOT obtained information about cultural resources through research; existing cultural resource studies completed as part of the Mountain View Corridor, East-West Connector, I-15 Utah County, and UTA Utah County FrontRunner projects; and a field survey of portions of the evaluation area that had not been previously surveyed. Prior to the field survey, UDOT sponsored searches of relevant records, literature, and GIS files archived at the Utah Division of State History's Antiquities, Preservation, and Library sections in Salt Lake City. Data to supplement these records were collected and archived. A literature review and consultation with UGS regarding paleontological resources were also carried out as part of the assessment.

The field survey of the evaluation area was completed in early 2008. This assessment consisted of an intensive-level pedestrian (walking) inventory for archaeological and paleontological resources and a selective reconnaissance-level survey for historical architectural resources. Some of the evaluation area was previously surveyed as part of the East-West Connector (also known as Pioneer Crossing) and I-15 Utah County road improvement projects, so the VC survey focused on those parts of the area of potential effects (APE) that had not previously been evaluated. The results of the previous inventories have been incorporated into the assessment of project impacts from the VC project. The results of the field surveys conducted specifically for the VC project are summarized in the following reports: *An Archaeological Inventory and Paleontological Assessment for the Vineyard Connector Cultural Resources Study Area, Utah County, Utah* (Nelson and Ellis 2008) and *A Selective Reconnaissance-Level Architectural Resources Survey for the Vineyard Connector Project, Utah County, Utah* (Ellis 2008a).

3.9.1.3 Summary of Current Conditions

A total of 4,057 acres were assessed for archaeological, paleontological, and architectural resources. As a result of these inventories, five archaeological sites and 20 properties containing 36 historical buildings were identified within the APE. No paleontological resources were found.

Of the five archaeological sites in the APE, four have been determined eligible for the NRHP. The remaining site has been determined ineligible for the NRHP. Table 3.9-1 lists the NRHP determinations for the five archaeological sites.

Table 3.9-1. Status of Archaeological Sites in the Area of Potential Effects

Site Identifier	Site Name	NRHP Status
42UT1029	Utah Southern/Union Pacific Railroad	Eligible
42UT1032	Lake Bottom Canal	Eligible
42UT1125	Denver & Rio Grande Western Railroad	Eligible
42UT1596	Historical structure	Not eligible
42UT1597	Geneva Steel plant remains	Eligible

Source: Nelson and Ellis 2008

Of the 21 properties that have historical buildings in the APE, eight have been determined to be eligible for the NRHP. The remaining 13 have been determined ineligible. Table 3.9-2 lists the 21 historical buildings and the NRHP eligibility of each.

Table 3.9-2. Status of Historical Buildings in the Area of Potential Effects

Eligible for Listing on the NRHP	Not Eligible for Listing on the NRHP
7482 North 6500 West, American Fork	Approx. 1300 South 500 East, American Fork
7360 North 6400 West, American Fork	6820 West 7333 North, American Fork
Approx. 5600 West 6800 North, American Fork	7155 North 6720 West, American Fork
1545 West 800 North, Orem	7500 North 7230 West, American Fork
186 N. Geneva Road, Orem	7326 North 7230 West, American Fork
1468 West 400 North, Orem	6535 North 5750 West, American Fork
Approx. 1465 West 400 North, Orem	6625 North 5750 West, American Fork
1383 West 400 North, Orem	Approx. 5155 West 600 North, American Fork
	Approx. 100 North 1300 West, Lindon
	802 N. Geneva Road, Orem
	660 N. Geneva Road, Orem
	Approx. 520 N. Geneva Road, Orem
	1412 West 400 North, Orem

Sources: Ellis 2008a, 2008b

In addition to the archaeological sites and architectural resources noted previously, several historic and prehistoric isolated artifacts were encountered during the cultural resource identification efforts. The vast majority of these isolates are secondary and tertiary irrigation ditches lining agricultural fields in the area; however, isolated historical bottle fragments and prehistoric lithic materials were observed. Isolated artifacts and features do not qualify for consideration under the NRHP (that is, they are not eligible for the NRHP).

3.9.2 Environmental Consequences

3.9.2.1 Methods Used To Identify Impacts

The Utah Administrative Code does not provide specific guidance on how to classify project effects. UDOT uses a variety of methods to identify and classify potential impacts on cultural and paleontological resources. For the VC, UDOT used guidance in 36 CFR 800.5(a)(1)–(a)(2), best professional judgment, and consultation with the Utah State Historic Preservation Officer. Under federal law (the NHPA), only those resources that are listed on or have been determined eligible for listing on the NRHP are required to be considered when assessing project effects. Under state law, resources that are included on or eligible for listing on the State Register would also be considered when assessing project effects. See Table 3.9-1 above, Status of Archaeological Sites in the Area of Potential Effects, and Table 3.9-2 above, Status of Historical Buildings in the Area of Potential Effects, for a summary of the eligible resources identified in the APE.

UDOT uses categories identified in 36 CFR 800 to classify project effects. These categories are:

- No Historic Properties Affected/No Effect
- No Adverse Effect
- Adverse Effect

The first two categories mean either that there would be no impact on a specific site or structure or that the impact would be so minor that the historic, prehistoric, or cultural meaning and integrity of the resource would not be harmed. A finding that an action would have an Adverse Effect means that the impact would be more severe. The implementing regulations of the NHPA characterize an Adverse Effect as follows (36 CFR 800.5[a][1]):

[An] adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying

characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

In order to identify which specific archaeological sites or architectural resources could be affected by the Action Alternative, the proposed design footprint of the Action Alternative was overlaid on maps showing the locations of the known cultural resources. In cases where the proposed design footprint appeared to be near or on the location of a known site or building, factors such as how much of the site or property would be affected, the nature of the impact (such as complete demolition, no direct impact but a change in ownership, minor ground disturbance, etc.), and the effect of the impact on the NRHP eligibility of the resource were evaluated.

3.9.2.2 No-Action Alternative

Under the No-Action Alternative, the VC would not be built, so there would be no new impacts to cultural or paleontological resources in the APE as a result of the project. Cultural and paleontological resources would continue to be removed and/or altered by private, commercial, and other land uses at their current rates.

3.9.2.3 Action Alternative

Four known NRHP-eligible archaeological sites and two known NRHP-eligible architectural properties would be directly affected by the Action Alternative. Table 3.9-3 below identifies the affected archaeological sites and architectural properties and summarizes the nature of the anticipated project impact. No known paleontological resources would be directly or indirectly affected by the Action Alternative. UDOT submitted information about the determination of eligibility and finding of effect (DOE/FOE) to the Utah State Historic Preservation Officer in November 2008. Concurrence is pending regarding the information in Table 3.9-3 as well as in Table 3.9-1 above, Status of Archaeological Sites in the Area of Potential Effects, and Table 3.9-2 above, Status of Historical Buildings in the Area of Potential Effects.

Table 3.9-3. NRHP-Eligible Archaeological Resources Affected by the Action Alternative

Site Number/Address/Name	Nature of the Anticipated Impact
42UT1029, Utah Southern/Union Pacific Railroad	The railroad would be crossed in one location near Geneva Road. The crossing would consist of either an at-grade crossing or an overpass over the railroad. About 37 meters of the railroad would be directly affected by the new crossing; however, the characteristics of the site that render it eligible for the NRHP would not be significantly affected (No Adverse Effect).
42UT1032, Lake Bottom Canal	The canal would be crossed in one location east of Geneva Road. The crossing would consist of a culvert along the canal to allow passage of the new roadway. About 39 linear meters of the canal would be directly affected by the new crossing; however, the characteristics of the site that render it eligible for the NRHP would not be significantly affected (No Adverse Effect).
42UT1125, Denver & Rio Grande Western Railroad	The railroad would be crossed in four separate locations. The crossings would consist of either at-grade crossings or overpasses over the railroad. A total of about 176 linear meters of the railroad would be directly affected by the four new crossings; however, the characteristics of the site that render it eligible for the NRHP would not be significantly affected (No Adverse Effect).
42UT1597, Geneva Steel plant site	The Action Alternative would pass along the extreme western margin of the site and then cross perpendicularly (east-west) across the site through the approximate center of the former blast furnace evaporation pond and the cooling pond. It would then pass through the center of the former mill site roughly following a dirt road. The area within the mill site that would be affected has mostly been graded and reclaimed following the demolition of most of structures at the site. In total, about 29 acres of the site would be directly affected by construction of the proposed roadway. Although construction of the road would alter the setting and feeling of the site somewhat by bisecting it, no major contributing features would be significantly affected, and the reasons for the site's eligibility for the NRHP under Criterion A would not be affected (No Adverse Effect).
1545 West 800 North, Orem	The Action Alternative would directly affect the property and structure; the edge of the proposed right-of-way would pass through the eligible building. Because the structure would need to be removed, the impact would render the property ineligible for the NRHP (Adverse Effect).

Mitigation Measures for Impacts to Cultural Resources

Mitigation measures for adverse effects to historic buildings will be necessary under the Action Alternative. The exact mitigation measures will be negotiated between UDOT, the Utah State Historic Preservation Office, and interested parties. These measures will be determined by historic protection experts to mitigate the impacts to these resources to the greatest extent feasible.

UDOT will ensure the protection, evaluation, and treatment of any historic property discovered prior to or during construction. UDOT Standard Specifications Section 01355, Part 1.13, Discovery of Historical, Archaeological,

or Paleontological Objects, Features, Sites, Human Remains, or Migratory Avian Species, will be enforced during this project. This specification stipulates procedures to be followed if any archaeological, historic, or paleontological resources and/or human remains are discovered during construction of the project.

3.10 Construction Impacts and Mitigation

This section describes the impacts from the construction of the Action Alternative. The affected environment would be the project footprint, which is generally the limits of road cut and fill or road right-of-way, whichever is larger.

The Action Alternative would require new construction in both developed and undeveloped areas as well as highly disturbed but vacant areas such as the former Geneva Steel plant site. The nature and timing of construction impacts in these areas would be related to the project's construction methods, the project phasing, and the nature of the area affected. As proposed, construction would occur over a 24-month period starting in the spring of 2009. Construction would be continuous, but certain phases would be undertaken only during the drier seasons.

Most construction-related impacts to the public would be associated with travel delays on local surface streets, but construction could also cause temporary impacts to air quality, water quality, wetlands, noise, visual resources, cultural resources, wildlife, hazardous waste sites, and invasive species.

Air Quality. Construction-related air quality impacts would be limited to short-term increases in fugitive dust, particulates, and local pollutant emissions from construction equipment. Most emissions would result from construction activities such as excavation, vehicle operation, and site disturbance.

During construction, air quality impacts will be prevented by using BMPs designed to minimize vehicle emissions and the release of fugitive dust, such as the use of modern construction equipment with adequate emission controls and site watering as needed to control dust. An emission-control plan will be submitted to the State of Utah to outline specific activities for emission control and monitoring throughout construction in accordance with state and federal requirements.

Water Quality. Excavation, grading, and other construction activities could increase sediment levels in stormwater runoff, and this sediment could enter nearby waterways. Sediment levels would be increased until the proposed project is completed and permanent soil-protection measures are installed. Because the project would disturb more than 1 acre of ground, a Utah Pollution Discharge Elimination System stormwater construction permit and a Stormwater Pollution

Prevention Plan (SWPPP) would be required for construction activities, consistent with federal law. Application of BMPs specified in the SWPPP will minimize impacts to surface water.

Wetlands. UDOT and its contractors will implement specific measures to ensure that wetland areas outside the road right-of-way are not directly affected during construction. Indirect effects from stormwater runoff will be prevented through implementation of BMPs outlined in the SWPPP.

Noise. Construction-related noise could be an inconvenience to residents living along or near the new road alignment. Construction-related noise would occur occasionally in different locations throughout the construction period. The most common noise source in construction areas would be from engine-powered machinery such as earth-moving equipment (bulldozers), material-handling equipment (cranes), and stationary equipment (generators). Mobile equipment (such as trucks and excavators) would generate noise occasionally, while stationary equipment (generators and compressors) generates noise at fairly constant levels.

These temporary construction-related noise impacts cannot be fully mitigated. However, the impacts could be minimized by staging construction so that a single area is not subject to noise impacts for the entire duration of construction, shutting off idling equipment, and limiting construction tasks known to produce very high noise levels (such as pile driving) to times of the day when residents are less likely to be disturbed.

Visual Resources. During construction, the work zone would be cleared of vegetation, and the exposed bare ground would contrast visually with the surrounding rural residential and agricultural areas that viewers of the area are accustomed to seeing. In addition, construction equipment and materials would clutter views in the construction area. Visual quality from sensitive viewer locations such as the scattered residences in the northern part of the evaluation area would be temporarily reduced during construction. Until construction is complete, the construction area would visually stand out. Also, if construction occurs at night, lighting could affect people near construction or staging areas.

The most noticeable visual impacts would follow the phases of construction. As phases are completed, UDOT and its contractors will remove temporary visual impacts such as stockpiled material and stored construction equipment and will restore affected areas.

Cultural Resources. During construction, previously unknown archaeological, paleontological, or historical resources could be found. The project plans and specifications will include Standard Specification 01355, Part 1.13, to address how the contractor would respond to such a find. If such resources are found,

construction activities in the affected area will stop. The contractor will notify UDOT of the nature and exact location of the find and will not damage or remove the resource. Work immediately adjacent to the discovery will be delayed, and the Region 3 NEPA/NHPA Specialist will evaluate and provide written confirmation when work can resume.

Wildlife. Construction activity tends to have a temporary effect on wildlife in or near the right-of-way because of higher noise levels, construction equipment activity, lights, and other effects. Construction-related impacts to wildlife would affect individuals nesting or foraging in the proposed project right-of-way.

As described in Section 3.6, Vegetation, Fish, and Wildlife, preconstruction surveys would help reduce construction-related impacts to nesting birds. However, since the impacts would be short-term and since there are no sensitive species in the evaluation area, no additional protection measures are proposed.

Hazardous Waste Sites. Construction workers could encounter previously undocumented soil contamination or other hazardous waste sites during project work. If such contamination or sites are encountered during construction, all activity in the affected area will stop until the hazard is evaluated and appropriate protection measures can be implemented.

Invasive Species. Construction operations would remove the existing hard surfaces and established vegetation, which would expose the underlying soils to the risk of being infiltrated by invasive weeds. Materials and equipment delivered to the job site could introduce invasive weeds into the area if seeds are present in imported soil or on equipment that is not properly cleaned. To mitigate the possible introduction of invasive weeds due to construction activities, the invasive weed BMPs in UDOT's current Standard Specifications for Road and Bridge Construction will be implemented and monitored and included in the plans and specifications for the project.

3.11 References

American Fork City

- 2004 American Fork City General Plan Transportation Element. February.
- 2005 Land Use Element of the General Plan. Adopted March 8.

[CEQ] Council on Environmental Quality

- 1970 Environmental Quality: The First Annual Report of the Council on Environmental Quality.

City of Orem

- 2001 City of Orem General Plan. Adopted February 13. As amended through August 2006.
- 2003 Orem Street Classification Map. January.
- 2008 GIS database of future land use for the City of Orem. January.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe

- 1979 Classification of Wetlands and Deepwater Habitats of the United States. Office of Biological Services, U.S. Department of the Interior, FWS/OBS-79/31.

[CRS] Caldwell, Richards & Sorenson

- 2008 Vineyard Connector Utility Study Final Report. March.

[DERR] Utah Division of Environmental Response and Remediation

- 2008 Interactive Map viewer. www.atlas.utah.gov/deqderr/default_ie.htm?Title=Utah%20DEQ%20-%20DERR%20Interactive%20Map. Accessed January 29, 2008.

Ellis, Sheri Murray

- 2008a A Selective Reconnaissance-Level Architectural Resources Survey for the Vineyard Connector Project, Utah County, Utah. SWCA Environmental Consultants, Salt Lake City.
- 2008b Addendum Cultural Resources Letter Report for the Vineyard Connector Project, Utah County, Utah. SWCA Environmental Consultants, Salt Lake City.

[EPA] U.S. Environmental Protection Agency

- 2008 Envirofacts Web page. www.epa.gov/enviro. Accessed January 29, 2008.

[EPA] U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Department of Agriculture, U.S. Department of Commerce, U.S. Department of the Interior, and U.S. Department of Transportation

- 2006 National Wetlands Mitigation Action Plan. www.mitigationactionplan.gov. Accessed September 5, 2007.

[FDOT] Florida Department of Transportation

- 2003 Project Development and Environmental Manual: Part 2, Chapter 9, Community Impact Assessment.

[FEMA] Federal Emergency Management Agency

- 2002 Flood Insurance Rate Maps, Utah County, Utah.
- 2006 Answers to Questions about the NFIP – Flood Hazard Assessments and Mapping Requirements. www.fema.gov/business/nfip/fhamr.shtm. Accessed January 19, 2006.
- 2007 Flood Insurance Study. www.fema.gov/pdf/fhm/dfm_dfft.pdf. Accessed May 14, 2007.
- 2008 *Community Status Book*. www.fema.gov/cis/UT.pdf. Accessed January 2008. [FEMA's Community Status Book is updated daily.]

Fertig, Walter, Rick Black, and Paige Wolken

- 2005 Rangewide Status Review of Ute ladies'-tresses. Prepared for the U.S. Fish and Wildlife Service and Central Utah Water Conservancy District. September 30.

[FHWA] Federal Highway Administration

- 1996 Retention, Detention, and Overland Flow for Pollutant Removal from Highway Stormwater Runoff. FHWA-RD-96-095.
- 2007 Synthesis of Noise Effects on Wildlife Populations. www.fhwa.dot.gov/environment/noise/effects.htm. Accessed March 22, 2007.
- 2008 Mountain View Corridor Final Environmental Impact Statement and Section 4(f) Evaluation. FHWA-UT-EIS-07-02-F. September.

[HDR] HDR Engineering, Inc.

- 2007a Phone record of conversation between Kimberly Hersey of the Utah Division of Wildlife Resources and Trent Toler of HDR Engineering regarding long-billed curlew and bobolink sightings in the project region. December 13.
- 2007b Wetland Delineation Report in Support of the Proposed East-West Connector, Northern Utah County. August.
- 2008a Notes from a meeting with American Fork City staff. January 22.
- 2008b Notes from a meeting with Lindon City staff. May 8, 2008.
- 2008c Wetland Delineation Report in Support of the Vineyard Connector Project. April.
- 2008d Vineyard Connector Wetland Delineation Report Addendum No. 1: Functional Assessment. April.
- 2008e Technical Report 1: Environmental Resources Not Affected by the Vineyard Connector Project. November.
- 2008f Notes from a meeting with landowners in the evaluation area. April 15.

Herbert, Rob

- 2004 Personal communication between Herbert, Utah Division of Water Quality, and Laynee Jones of HDR Engineering regarding classified aquifers. September 30.

[J-U-B] J-U-B Engineers

- 2006 Lindon City General Plan Land-Use Map. Prepared for Lindon City. June.
- 2007 Town of Vineyard Land-Use Plan. Prepared for Town of Vineyard. February 28.

Jensen, Mark

- 2008 E-mail correspondence between Jensen, Utah Division of Drinking Water, and Rosemary Fasselin of HDR Engineering regarding GIS files containing information about groundwater protection zones and public water drinking sources. June 16.

June Sucker Recovery Implementation Program

No date June Sucker Recovery Implementation Program [Web site]. www.junesuckerrecovery.org. Accessed September 10, 2007, and October 1, 2008.

Knobloch, Wendelin

2008 Personal communication between Knobloch, American Fork City planner, and Dana Holmes of HDR Engineering regarding American Fork City annexations. January.

Lehi City

2001 General Plan Land-Use Element. Adopted August 23, 2001. As amended through November 15, 2005.

2008 General Plan Transportation Element Master Transportation Plan. Approved June 10, 2008.

[MAG] Mountainland Association of Governments

2006 Lake Mountain Transportation Study. September.

2007 2030 Regional Transportation Plan.

Mills, Mike

2007 Personal communication between Mills, Aquatics Species Lead with the Utah Division of Wildlife Resources, and Rick Black of HDR Engineering regarding June sucker and leatherside chub. September 10.

National Audubon Society

2000 The Jordan River Natural Conservation Corridor Report. Prepared for the Mitigation Commission and the U.S. Fish and Wildlife Service.

[NCHRP] National Cooperative Highway Research Program

2001 Guidebook for Assessing Social and Economic Effects on Transportation Projects. Report 456.

Nelson, Ellen W., and Sheri Murray Ellis

2008 An Archaeological Inventory and Paleontological Assessment for the Vineyard Connector Cultural Resources Study Area, Utah County, Utah. SWCA Environmental Consultants, Salt Lake City.

Parrish, J.R., F.P. Howe, and R.E. Norvell

2002 Utah Partners in Flight Avian Conservation Strategy Version 2.0. Utah Partners in Flight Program, Utah Division of Wildlife Resources. Publication Number 02-27.

Salt Lake County

2000 Stormwater Quality Data Technical Report. Prepared by Stantec Consulting. September.

U.S. Bureau of Economic Analysis

2007 Regional Economic Accounts. www.bea.gov/regional. Accessed December 4, 2007.

[UBRC] Utah Birds Record Committee

No date Comprehensive list of bird sightings. www.utahbirds.org/RecCom/RareBirdsIndex.html. Accessed October 1, 2008.

[UDOT] Utah Department of Transportation

- 2005 UDOT Manual of Instruction – Roadway Drainage.
- 2006 Functional Assessment Method.
- 2007 Relocation Assistance Brochure. January.

[UDWR] Utah Division of Wildlife Resources

- 2007a County Lists of Utah’s Federally Listed Threatened (T), Endangered (E), and Candidate (C) Species. dwrcdc.nr.utah.gov/ucdc/ViewReports/te_cnty.pdf. Accessed January 29, 2008.
- 2007b Utah Natural Heritage Program Database.
- 2008 Utah Conservation Data Center. dwrcdc.nr.utah.gov/rsgis2/search/Display.asp?FINm=melalewi. Accessed June 16, 2008.

[USACE] U.S. Army Corps of Engineers

- 1987 Corps of Engineers Wetlands Delineation Manual. Prepared by the Environmental Laboratory, Waterways Experiment Station. Wetlands Research Program Technical Report Y-87-1. Available at www.spk.usace.army.mil/organizations/cespk-co/regulatory/pdf/Delineation%20Manual.pdf.

[USDA] U.S. Department of Agriculture

- 2002 2002 Census of Agriculture.

[USFWS] U.S. Fish and Wildlife Service

- 2001 Status Review for Bonneville Cutthroat Trout, United States Department of the Interior, USFWS, Regions 1 and 6, Portland, Oregon and Denver, Colorado. October 2001.
- 2007 Endangered, Threatened, Proposed and Candidate Species, Utah Counties. Produced by the Utah Field Office. November.

[UTA] Utah Transit Authority

- 2008 Provo to Salt Lake City FrontRunner decision document. January.

[Utah AGRC] Utah Automated Geographic Resources Center

- 2008 SGID: Utah’s Statewide Geographic Information Database. gis.utah.gov/component/option.com_dbquery/Itemid,87. Accessed January 2008.

Utah County

- 2006 Utah County General Plan. Adopted October 17. As amended on March 20, 2007.
- 2007 Map file of agricultural covenants (Agriculture Protection Areas). Produced by Utah County Public Works, Mapping Division. May. Confirmed accuracy of data in October 2008.

Utah Department of Agriculture and Food

- 2007 2007 Utah Agricultural Statistics and Utah Department of Agriculture and Food Annual Report. September.

Utah Department of Workforce Services

- 2005 Annual Report of Labor Market Information. jobs.utah.gov/opencms/wi/pubs/em/annualreport/05annual. Accessed December 4, 2007.
- 2006 Utah County Demographic and Economic Profile. jobs.utah.gov/jsp/wi/utalmis/countyprofile.do;jsessionid=1488DA868458D9590FE5E6602602FB40. Accessed December 4, 2007.
- 2007 Utah County's largest employers based on average annual employment 2006. jobs.utah.gov/opencms/wi/regions/mountainland/utah/utahme.pdf. Accessed December 4, 2007.

Utah Division of Water Quality

- 2002 Utah Lake – Jordan River Watershed Management Unit Stream Assessment. Prepared by Thomas Toole. August.
- 2004 Utah's 2004 303(d) List of Impaired Waters. April 1.
- 2008 In-progress TMDL Water Quality Studies. www.waterquality.utah.gov/TMDL/index.htm#inprogress. Accessed January 2008.

Utah Division of Water Resources

- 1997 Utah State Water Plan, Utah Lake Basin. www.water.utah.gov/planning/SWP/uth_lk/uth_lake.pdf. December. Accessed September 27, 2004.
- 2003a West Colorado River Basin – Utah State Water Plan. www.water.utah.gov/planning/SWP/uth_lk/Utahindex.htm. July-August. Accessed January 2008.
- 2003b A Water-Related Land-Use Summary Report of the State of Utah.
- 2006 West Colorado River Basin – Utah State Water Plan. www.water.utah.gov/planning/SWP/westcol/westcolindex.htm. July-August. Accessed June 2008.

Utah Division of Water Rights

- 2008 Complete record of points of diversion. www/waterrights.utah.gov/gisinfo/wrcover.asp. Accessed April 15, 2008.

Utah Governor's Office of Planning and Budget

- 2007 2005 Baseline Economic and Demographic Projections. governor.utah.gov/dea/ERG/ERG2008/ProjectionSummary.xls. Accessed December 4, 2007.

Utah State Auditor's Office

- 2007 2006 financial statements for Utah County, American Fork, Orem, Lindon, and Vineyard. www.sao.state.ut.us/reports/lgfs.htm. Accessed December 4, 2007.

Verboom, J., R. Foppen, P. Chardon, P. Opdam, and P. Luttikhuisen

- 2001 Introducing the key patch approach for habitat networks with persistent populations: an example for marshland birds. *Biological Conservation* 100(1): 89–101.

White House Office of Environmental Policy

- 1993 Protecting America's Wetlands: A Fair, Flexible, and Effective Approach. www.wetlands.com/fed/aug93wet.htm. August 24. Accessed October 2007.